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ABSTRACT

One of twelve instructional units in the Native American Career Education (NACE) program, this unit is intended to help Indian junior high school students understand concepts involved in the management of natural resources, especially as they relate to traditional Indian values; understand the relationship between basic needs, resources, and waste disposal methods; and become familiar with occupations in the area of environmental and natural resource management. The six activities deal with the related subject areas of life sciences, ecology, and careers in these areas. Each activity includes objectives, student materials, and suggestions to the teacher on how to use them. Student exercises consist of readings, questions to answer, games, simulations, project instructions, and other learning activities. Each activity is followed by suggestions for ways of extending learning and, where appropriate, additional resources are described. Student materials may be used as master copies for reproduction or as models for material development. A test designed to measure student mastery of the main objectives is included with each unit, along with an answer key. (A guide to the whole twelve-unit program is also available--CE 014 035.) (TA)

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ED147602

LIVING WITH THE LAND

Native American Career Education

Unit

We would like to thank the R-3 Project of the San Jose Unified School District for permission to adapt the game in Activity #1.

The readings on ecology in Activities 2, 3, and 4 are based on the handbook, Environmental Science, from the Merit Badge series of the Boy Scouts of America.

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by

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This document is one of a series of teaching/learning units dealing with Native American Career Education. The titles of all individually available documents in this series appear below:

Career Awareness units
Part of the Whole World
Cooperation
From Idea to Product
The Community
The Community in Transition

Career Orientation units
Putting Your Money to Work
Living with the Land
Working for the People

Career Exploration units
Planning
Putting It All Together
Getting Ready for Jobs
The Career Fair

and

Native American Career Education,
A Curriculum Guide

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Foreword

The Native American Career Education Program consists of twelve units designed to address the specific needs and aspirations of Native American students. It includes teacher and student materials, evaluation materials, and a Curriculum Guide.

These units employ a variety of learning activities. They are designed to: 1)bridge the gap between traditional and technological societies by identifying the parallels between them and exploring the values they represent; 2) create an understanding of the economic context within which career choice takes place; 3) foster personal and interpersonal skills necessary to function in the world of work; and, 4) develop career exploration skills.

Development has been based on the recognition that the needs of Native American communitites differ greatly from those of the larger American society. In these communities, as in third world countries, problems are not due to a lack of natural resources, but rather to a lack of meaningful development of human resources which would allow for additional economic development and self-determination of Native American communities.

In order to identify and meet these needs, information has been gathered from Native American communities, students, teachers, and tribal groups, and the materials have been developed with the guidance of an advisory committee of Native Americans.

This project was supported by the Curriculum Development Branch of the U.S. Office of Education.

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Preface

Career Education is an important part of every student's preparation for becoming a productive member of society. In the process of Career Education, he becomes aware of himself, of his community, of the world of work and of the use of leisure time. Career Education also enables the student to classify various occupations, and to relate subject matter to career development.

The unit, "Living with the Land," helps the student become aware of the interdependence of man and his environment, which includes all species of animals, plants, water, and the atmosphere, and to develop the economic awareness which will teach him about the skills needed to successfully manage natural resources.

Before man in his greed ravaged the earth in search of minerals; wantonly killed wildlife for food which he could not use wisely; made many streams, lakes, rivers and oceans unfit to support life because he wanted to increase the productivity of his factories; before he laid waste the vast stands of timber and grasslands; Nature maintained a delicate balance between man, animal, plant life, and the atmosphere.

As long as the balance was maintained, everyone benefited, but when the balance was upset by man and nothing done to restore it, everyone and everything suffered. Man is now learning that it takes many years to correct his mistakes. In many instances, for example when animal species are exterminated, the mistakes can never be undone. Man is only now becoming aware that many specialists are needed to wisely manage natural resources. Many men and women are therefore making a career in the ecological sciences.

The American Indian has always known he should live in harmony with Nature. So ingrained is this belief that it became a dominant part of his religion. The Indian was aware that greedy, careless and inconsiderate use of the bounties of nature would return to him in the form of penalties. He was therefore taught from childhood to respect Nature, not to waste anything, and to gather and kill only enough to meet his needs.

As "Living with the Land" shows, there are many careers in the field of Natural Resource management, and since natural resources are a fixed quantity, one immediately becomes aware of the need to protect, conserve, and develop substitutes for them. This unit makes us aware of the ecological problems we face. It also makes us aware of the careers which help Nature maintain the ecological balance which was intended so that we all can benefit from the bountifullness of Mother Earth.

Donald A. McCabe, Navajo
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and Development
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Contents

This book includes all information and student materials needed for the unit, "Living with the Land." In some activities, students will be asked questions which they must answer in writing. Many of these questions have no single "right" answer. For your convenience, some sample answers have been printed after each set of reproduced questions.

At the end of this guide, you will find an annotated resource list. This has been included to help you locate good, appropriate audio-visual materials in order to stimulate student interest in the unit and to enrich their individual learning experiences.

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An Overview Of The Unit

General Purpose

Living with the Land, Unit #7 in the Native American Career Education series, presents basic environmental concepts and a survey of the careers which use them.

As Philosopher and Environmentalist Buckminster Fuller and others have pointed out, the earth is a closed system with limited resources, which must be carefully balanced for it to function. Unless we learn to understand this balance and work with it, the delicate cycle of nature may be upset permanently, with disastrous results for man and all other living things.

Everyone needs to know how man relates to his environment, but it is perhaps especially crucial that young Indians, whose homelands include some of the last natural areas in the United States, understand these principles. In the future they will be making the decisions about how the land is to be developed, and it will be their responsibility to see that this development not only promotes the well-being of the people, but maintains the natural balance of which man is only a part.

The traditions of the Indians themselves provide many statements of the principles which should govern man's relationship to his world. However, in making practical decisions, it is also important to know how these principles can be applied. Understanding what professionals in the area of environmental and resource management do, or even planning to pursue such a career oneself, are good ways to translate theory into practice.

Goals and Objectives

In this unit, there are six Activities. Each Activity has a specific goal and a specific objective. These are as follows:

Activity 1. *What is Ecology All About?*

GOAL: To introduce some basic facts about ecology

OBJECTIVE: Students will play a game in which they answer simple questions about soil, water, air, and plant life.

Activity 2. *What Do We Need?*

GOAL: To help students understand basic human needs

OBJECTIVE: Students will give examples of how people met their needs in a traditional Indian home and how some people meet their needs today.

Activity 3. *Resources or, Getting What We Need*

GOAL: To help students understand the importance of natural resources

OBJECTIVE: Students will give examples of how people in a traditional Indian home used resources to meet their needs and how people in a modern American home use these resources today.

Activity 4. *Where Does It All Go?*

GOAL: To help students understand the problem of pollution

OBJECTIVE: Students will give examples of waste disposal methods used in a traditional Indian home and those used in a modern American home today.

Activity 5. *Doing Something About It*

GOAL: To introduce some basic facts about environmental careers

OBJECTIVE: Students will answer questions about jobs associated with environmental and natural resource management.

Activity 6. *Who Will Take Care of the Land?*

GOAL: To help students understand some of the environmental implications of a current land-use problem

OBJECTIVE: Given a land-use problem, students will identify job titles of people who would be useful in deciding how to solve it.

Summary

The first Activity, "What is Ecology All About?" is intended to familiarize students with basic ecological concepts and terms. It includes a learning game and a reading with review questions.

The second Activity, "What do we Need?", marks the first step in laying a groundwork of concepts basic to an understanding of man's relationship to the environment. It uses pictures of common items found in a traditional Indian and a contemporary house to illustrate the universality of certain basic needs, and the diversity in the way people meet them.

In Activity 3, "Resources," the two pictures are used once more, this time as a basis for comparison of resource use in the two cultures. Students also read about basic resources, and about types and ways of producing energy.

Activity 4, is titled "Where Does It All Go?" and deals with ways of dealing with waste products and their effect on the environment. This activity also includes a reading.

The fifth Activity, "Doing Something About It," surveys environmentally-directed Management, Monitoring and Inspection, Research, and Operations careers.

Activity #6, "Who Will Take Care of the Land?" uses a description of an actual environmental problem facing an Indian tribe to allow students to figure out the relevance of the careers they have learned about.

The obvious place in a Junior High School curriculum for this unit would be in a Biology, Life Sciences, or other science class in which ecology has been studied. If the class is already familiar with ecological principles and terms from other materials, many of the readings in this unit could be skipped or used for review purposes, or the unit could be used as the introduction to a more detailed study of the environment.

All units in the Native American Career Education program should be tailored to meet the interests and needs of the individual students in your class. You will have to decide when students should work in small groups and when they will benefit more by working alone, when the exercises should be done in class, and when assigned as homework. Be flexible. Shape the unit so that it will fit your teaching style, your students' needs, and the amount of time available.

After many of the Activities, an Additional Activities section suggests possibilities for expansion of the material students have just covered. These activities are recommended to reinforce student learning and make it more meaningful, but are not necessary for mastery of the main concepts being taught.

At various points in the instructions you may find questions for discussion. It is not essential that students respond orally to these questions. When students are not used to responding in this way, trying to get a class discussion going may be more frustrating than useful.

Alternative approaches include simply talking about the questions--their implications and possible answers--in a general way (an informal lecture, in fact). Where time allows, you may ask students to discuss questions with other members of their workgroups, or put them on the board and have students respond in writing.

Timing

Timing for this unit depends to a great extent upon how much of the work is to be done in class, whether the teacher wishes to include any of the optional activities, etc. Average scheduling would be 4-6 weeks.

Materials:

For this unit you will need:

- pencils and paper for written exercises
- tape, scissors, glue or paste
- 4 sheets cardboard for each workgroup for Activity 1
- 1 die for each workgroup
- 1 marker or token for each student
- duplicated pages from this Guide as indicated in the instructions for each exercise

Introducing The Unit In Class

To begin, write on the board the words "Living with the Land." Explain that this is the title of the unit students will be studying next. Ask them to think about what a unit with that title would probably be about. Since this is a career education unit as well, ask them if they can think of any jobs which would help people live with the land. List some of their speculations on the board and leave them.

If you have used any of the other units in the Native American Career Education program with this class, you have probably already discussed the passage from the poem on p. 7 , and the section "What Native American Career Education Is All About." If so, turn now to the section headed "Introducing This Book" on p. 6 of this Gui[illegible]

Reading the Poem

Reproduce and hand out, or write on the board or a piece of poster-board the passage from "Old Way, New Way," by David Martin Nez (p. 7). Read the passage aloud. When you have done, ask students what they think the poem is saying. Possible answers include: 1) that it is important to learn what other cultures have to offer; and 2) that it is important to understand and preserve the beauty of one's own culture. Emphasize that the poet feels that it is possible to adopt some elements of non-Indian culture while retaining one's own Indian identity.

Introducing the Program

If the class has not had earlier units in this series, write the words, Native American Career Education on the blackboard. Ask students to discuss what they think this phrase means. If they have trouble getting started, help them by breaking the concept into parts. Ask students questions that will [illegible] the class step by step to a general understanding of the ideas involved. Students should be encouraged to work together in small groups to answer questions like these:

1. What is an American?
2. What is a Native American?
3. What is a career? Can you name some examples of different types of careers? Are there any careers which interest you right now? How do people get started in careers?
4. What do you think that career education is?
5. What do you think that career education for Native Americans is? How might this be the same as career education for other kinds of Americans? How might it be different?
6. Why do you think we are going to study Native American Career Education now? How can this type of education play an important part in your life? What kinds of things do you think you need to learn about careers?

Reproduce and hand out to students copies of p. 8 in this book. This reading is titled "What Native American Career Education Is All About." Ask students to read this page and then discuss what they have read. Focus student attention on certain key ideas by repeating some of the earlier discussion questions. Ask, "How Can Native American Career Education play an important part in your life? What kinds of things do you need to know about careers?"

Introducing the Book

Discuss with the class what they now think the book is going to be about. Review the suggestions which were written on the board at the beginning of the introduction. Ask students to add to this list any new ideas they may have to offer. Explain (or confirm) that "Living with the Land" is about the way that nature and its resources affect our lives. Read, or reproduce and give to students to read, the section called "What This Book Is All About," which appears on pp. 9-10 of this Guide. As you review its content, include the following ideas:

> The students will be asked to work together in small groups for many of the activities in this unit. There are two reasons for this. First, small group work has been found to be a good way of doing the types of activities which this unit involves and, second, small group work will expose the students to the kinds of group situations which they will experience on most jobs.

These lines are taken from the poem "New Way, Old Way," published by The Writers'Reader, 1964, copyright 1969. Used by permission of the author, a former student at the Institute of American Indian Arts, Santa Fe, New Mexico, a Bureau of Indian Affairs school.

We shall learn all these devices

The white man has.

We shall handle his tools

For ourselves.

We shall master his machinery,

his inventions,

his skills,

his medicine,

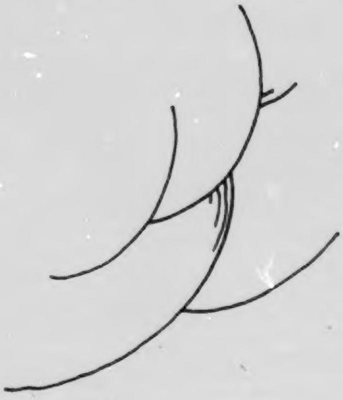
his planning;

But we'll retain our beauty

And still be Indian.

David Martin Nez

What Native American Career Education Is All About



All over the country, Indian students, parents, and community people are asking, "Where can we find good jobs?" For too long, too many Indians have ended up with poor jobs or no jobs at all. Career education is one way to change this.

Planning for a career should begin long before you actually start working. But what kinds of jobs are there? What are different jobs like? How do different jobs fit together? How do you find out which job would be best for you? Career education is one way to find the answers to questions like these.

Native American Career Education is a program that has been written especially for Indian students. Indians from many tribes have helped plan, write, and test this program to make it as useful as possible to you. Some of the activities may seem like games. That's because we think learning can be fun. Sometimes even work is fun!

Good luck!

What This Book Is All About

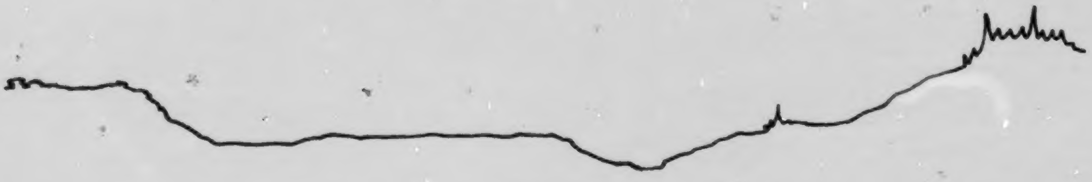
Is man part of nature?

Does what people do make any difference?

Why should we worry about "managing" natural resources?

Is there any way we *can* manage natural resources?

Ecology is often in the news these days--But what is the fuss all about anyway? Some people say that man has the right to use plants, animals, soil, water and air as much as he pleases and in any way he pleases. Others believe that man is part of nature and that people, plants, animals and all the other parts of nature must work together. Still others say that everything people do to the rest of nature will some day have an effect on them.



How should we use nature and its resources? This is one of the most important questions facing people today. There is not much land left that people have not changed in some way. What will we do with what remains? Is there any way we can fix what has been hurt already? Is it worth the trouble? These are some of the questions you will be asked to think about in this book.

When you have finished this book, you should know something about:

1. how the different parts of nature are related to each other and to man;
2. how basic needs were met in a traditional Indian and a modern American setting;
3. how resources are used to meet needs, where the energy to run our cities comes from, and how resources can be saved,
4. what pollution is and where it comes from;
5. what jobs are part of environmental and natural resource management; and,
6. what different uses of natural resources might do to affect an area, and who can help solve the problems that come up.

Activity 1. What Is Ecology All About?

GOAL: To introduce some basic facts about ecology

OBJECTIVE: Students will play a game in which they answer simple questions about soil, water, air, and plant life.

WHAT STUDENTS WILL BE ASKED TO DO

- Play a game in which they encounter ecological concepts
- Read a summary of basic ecological principles
- Review what they have learned by writing down definitions of basic ecological terms

MATERIALS NEEDED

- 1 gameboard for each workgroup
- 1 set of question cards for each workgroup
- 2 ecology game scoresheets for each workgroup
- 1 marker or token for each student
- paper and pencils
- 1 die for each workgroup

PROCEDURE

Exercise 1. The Ecology Game

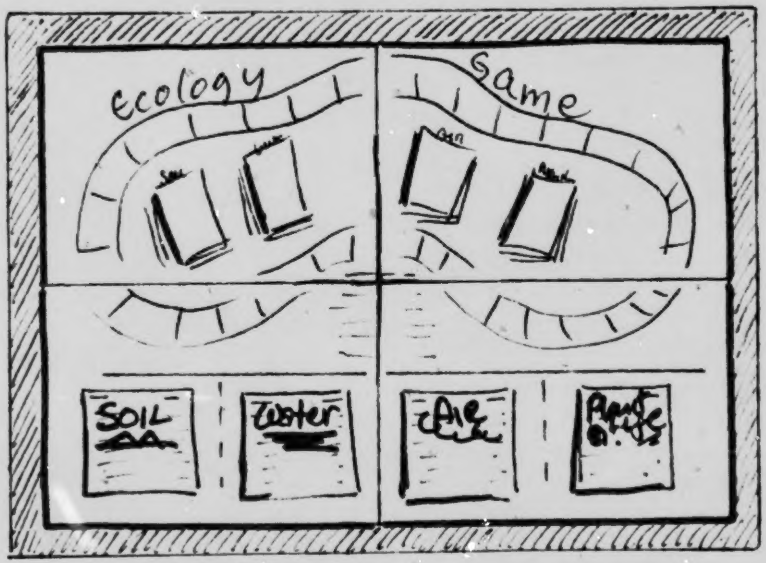
Before beginning to explore ecological principles as they relate to Native American goals and values, students should have a general knowledge of the concepts involved. In this first Activity, students will play a game which will introduce these concepts if they are not familiar with them, or refersh their memories if they have encountered them before.

1. Prepare a complete set of Ecology Game materials for each workgroup (between four and six students) in your class.

The Gameboard

On pages 15-18 of this manual you will find masters for the gameboard. Xerox or trace these on to dittomasters, and tape them together to form the gameboard. You may want to glue them to a cardboard backing to increase durability and cover with plastic.

Now make as many copies of pages 19-20 as you have gameboards. Cut them up, and paste or staple them to the gameboards with the name and picture of the resource covering the answer key.



You will also need:

°Four decks of Question Cards (one each on soil, water, air and plant life). Masters for these are on pages 21-36.

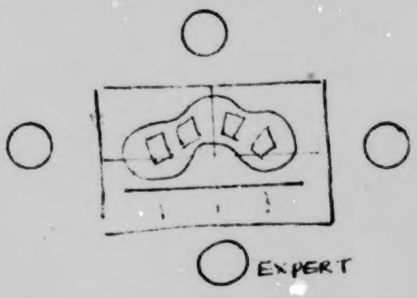
°One die;
°Six markers or tokens (one for each player). These can be stones, coins, empty spools of thread painted different colors, etc.;
°Two Ecology Game scoresheets (pages 42) per group.
°Paper and pencil (for the "expert).

2. Distribute the game materials to the workgroups. Tell students that they are going to play the "Ecology Game" as a preparation for learning about ecology problems that may face their own area, and careers associated with managing natural resources. Give each workgroup a copy of the direction on p.

   a. Appoint a high achiever as the "Expert" in each group. In addition to playing the game, the "Expert" looks up the correct answers to questions. He may also serve as scorekeeper, or if there are six players, this job may be given to another student.

   b. Describe how the gameboard is set up. The "Expert" sits facing the "Expert" position on the gameboard.

The other players sit around the table. The four decks of question cards are placed face down in the appropriate positions on the gameboard. Give the scorekeeper "Expert" a pencil and paper for scorekeeping.



   c. Tell the students that everyone will begin the game with 5 points.

   d. Distribute markers to all players.

   e. Have each player place his marker on the "Start" position, and have each player roll the die to determine starting order. High number will move first.

   f. After players have determined their order of moves, have the student who is to move first roll the die again, and tell him to move his marker the same number of spaces as the number on the die. Movement is counterclockwise, as shown on the gameboard.

g. Tell the player to follow the directions printed in the space where his token landed. If the space says "Win 1", a point is added to his score. If it says "Lose 1" a point is subtracted. In addition, if the space in which he has landed has a star, the player must draw a question card from any one of the four decks in the middle.

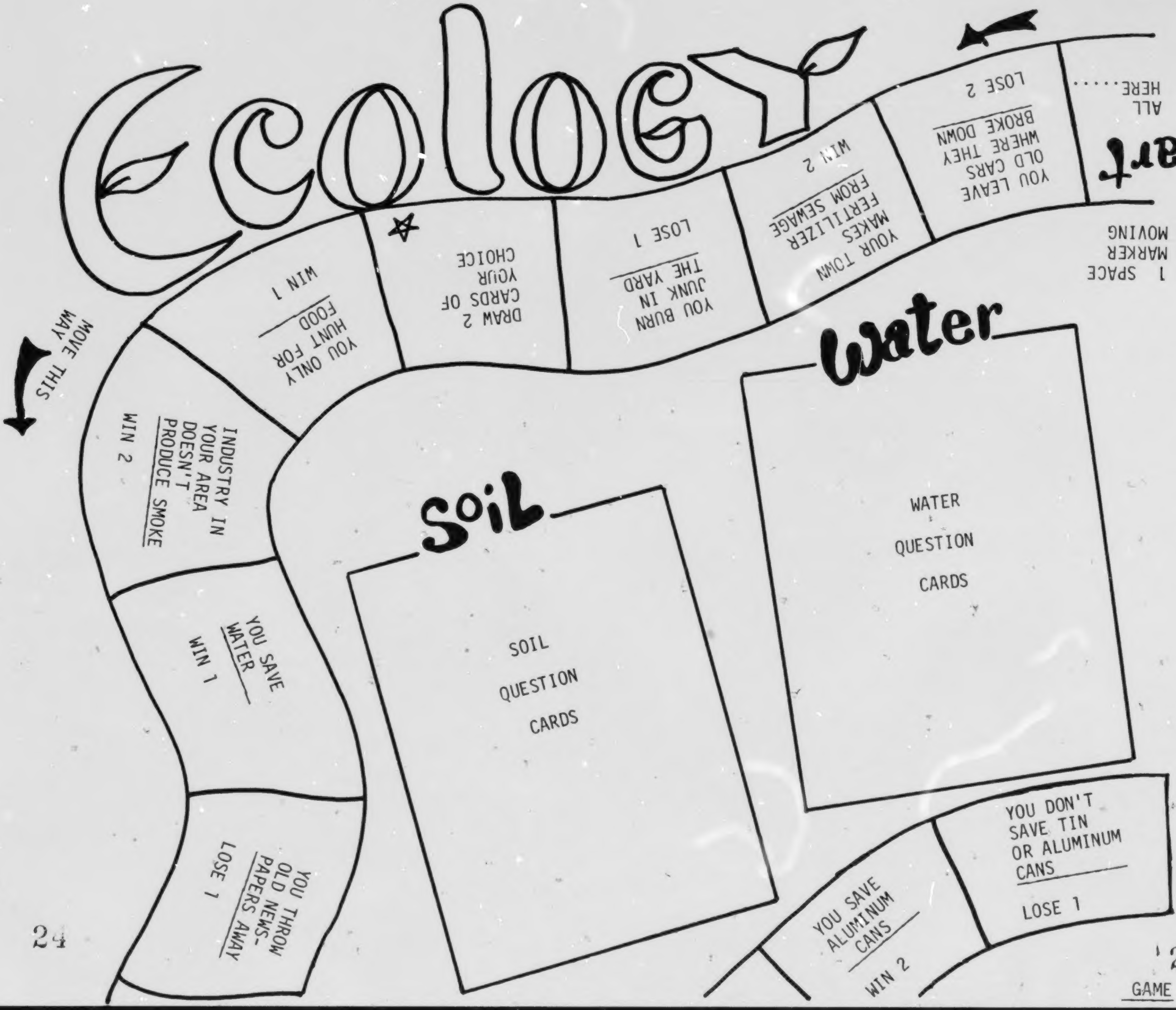
h. The player draws a card, reads it aloud, gives an answer aloud, and buries the card face-down in the deck again. The "Expert" looks up the correct answer in the appropriate answer key on the gameboard. He tells the answering player whether he was right or wrong. If the student was wrong, the "Expert" reads the right answer aloud from the answer table and the student loses 1 point. If the student was right, he earns 5 points the "Expert" adds to that student's score.

i. It is now the turn of the player who originally rolled the second highest number to move. When he is done, the third highest player will move, and so forth. All players move in this order throughout the game.

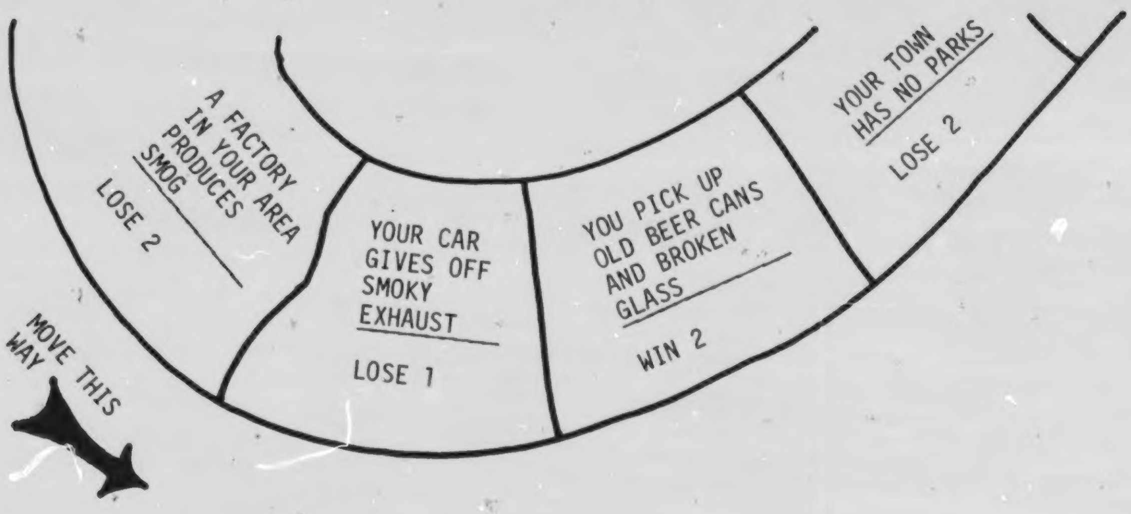
j. The teacher should circulate among the workgroups as they play to make sure they are playing the game correctly and to answer questions.

k. The game should be played for 30-45 minutes to make sure that students will be exposed to a considerable amount of information. After 30-45 minutes, the teacher should call out, "One more player may move," and after this move, "Stop all playing."

If you wish, you can let students compare their final scores so that they will know who won. You may want to give some public recognition to the *workgroup* whose players totaled the highest.


Ecology
Start
ALL
HERE......
1 SPACE
MARKER
MOVING
YOU LEAVE
OLD CARS
WHERE THEY
BROKE DOWN
LOSE 2
YOUR TOWN
MAKES
FERTILIZER
FROM SEWAGE
WIN 2
YOU BURN
JUNK IN
THE YARD
LOSE 1
DRAW 2
CARDS OF
YOUR
CHOICE
YOU ONLY
HUNT FOR
FOOD
WIN 1
MOVE THIS
WAY
INDUSTRY IN
YOUR AREA
DOESN'T
PRODUCE SMOKE
WIN 2
YOU SAVE
WATER
WIN 1
YOU THROW
OLD NEWS-
PAPERS AWAY
LOSE 1
Soil
SOIL
QUESTION
CARDS
Water
WATER
QUESTION
CARDS
YOU SAVE
ALUMINUM
CANS
WIN 2
YOU DON'T
SAVE TIN
OR ALUMINUM
CANS
LOSE 1

GAME

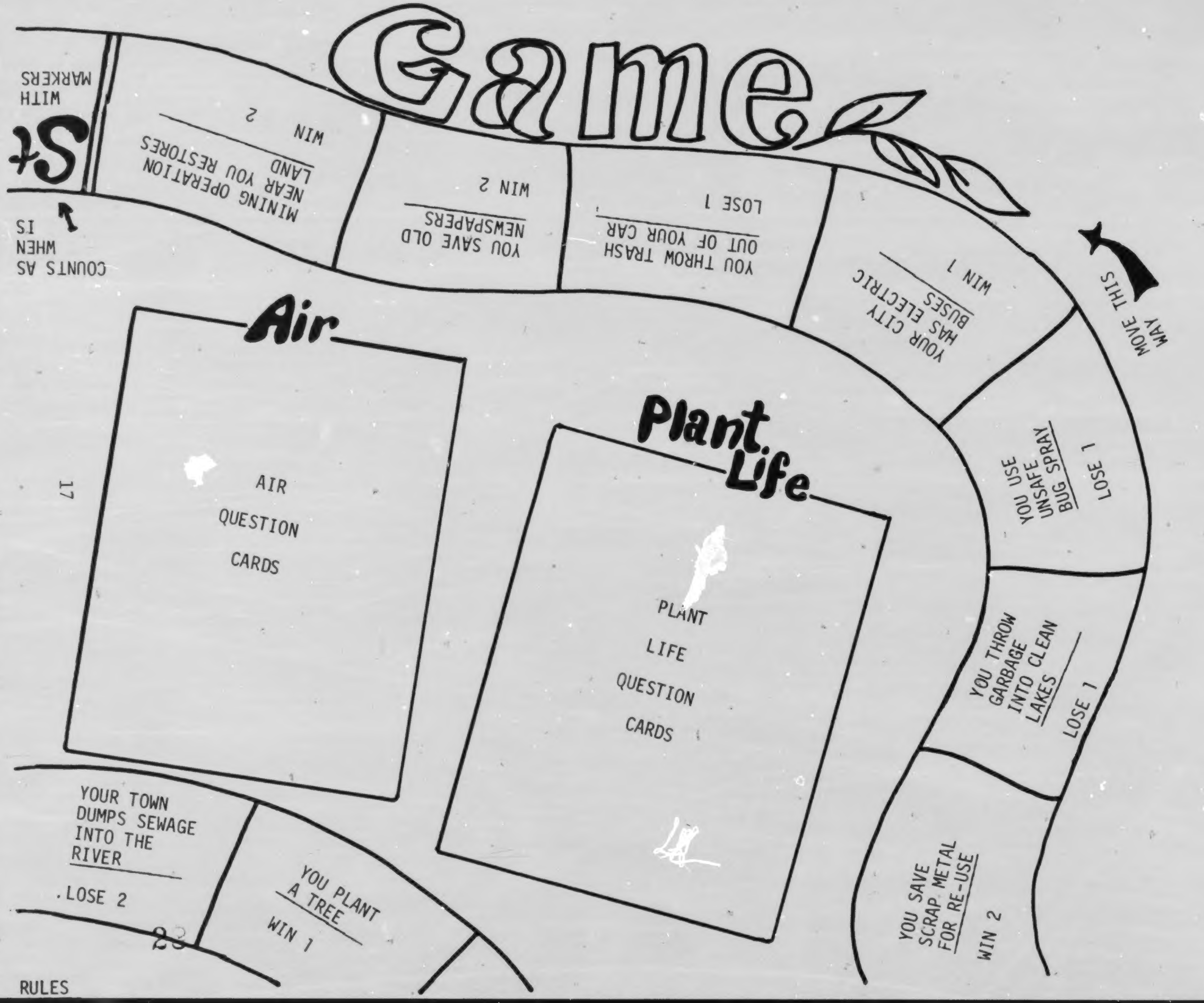

A FACTORY IN YOUR AREA PRODUCES SMOG
LOSE 2
YOUR CAR GIVES OFF SMOKY EXHAUST
LOSE 1
YOU PICK UP OLD BEER CANS AND BROKEN GLASS
WIN 2
YOUR TOWN HAS NO PARKS
LOSE 2
MOVE THIS WAY

1. All markers begin
2. Each player rolls
3. Roll die. Move as marks on die.
4. Add or subtract
5. If you land in a draw a card from
6. Your answers to win or lose pts.
7. Expert looks

Expert

Attach Answer Key for SOIL questions here.

Attach Answer Key for WATER questions here.


Game
St
WITH MARKERS
COUNTS AS WHEN IS
MINING OPERATION NEAR YOU RESTORES LAND
WIN 2
YOU SAVE OLD NEWSPAPERS
WIN 2
YOU THROW TRASH OUT OF YOUR CAR
LOSE 1
YOUR CITY HAS ELECTRIC BUSES
WIN 1
MOVE THIS WAY
YOU USE UNSAFE BUG SPRAY
LOSE 1
YOU THROW GARBAGE INTO CLEAN LAKES
LOSE 1
YOU SAVE SCRAP METAL FOR RE-USE
WIN 2
Air
AIR QUESTION CARDS
Plant Life
PLANT LIFE QUESTION CARDS
17
YOUR TOWN DUMPS SEWAGE INTO THE RIVER
LOSE 2
YOU PLANT A TREE
WIN 1
23
29

RULES

at START with 5 pts.

the die. High number goes 1st.

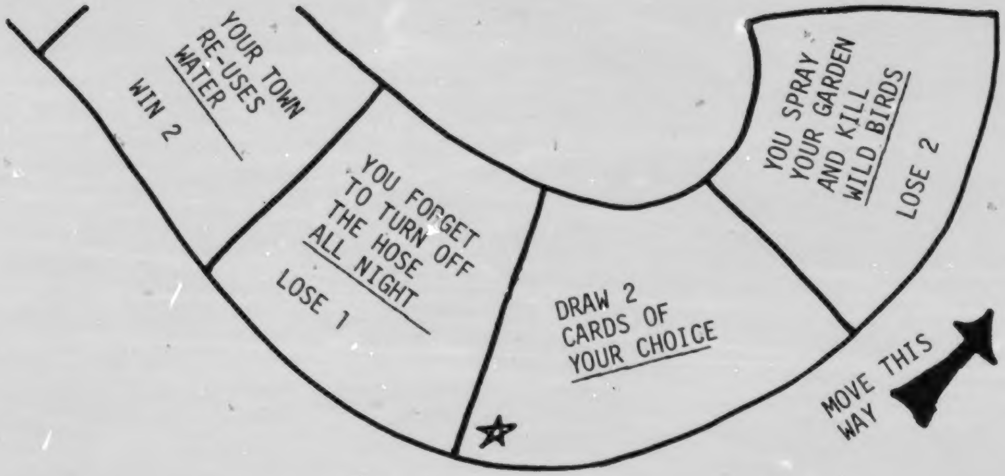
marker same number of spaces

points as indicated in space.

box with a star, you must
one of the piles.

card questions will make you

up answers.



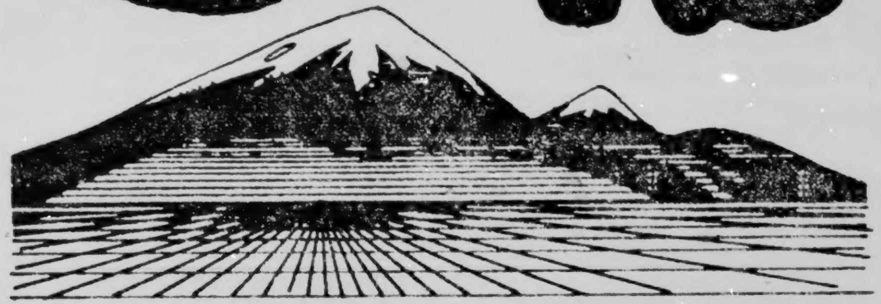
YOUR TOWN RE-USES WATER
WIN 2
YOU FORGET TO TURN OFF THE HOSE ALL NIGHT
LOSE 1
DRAW 2 CARDS OF YOUR CHOICE
YOU SPRAY YOUR GARDEN AND KILL WILD BIRDS
LOSE 2
MOVE THIS WAY

sits here

Attach Answer Key
for AIR questions
here.

Attach Answer Key
for PLANT LIFE
questions here.

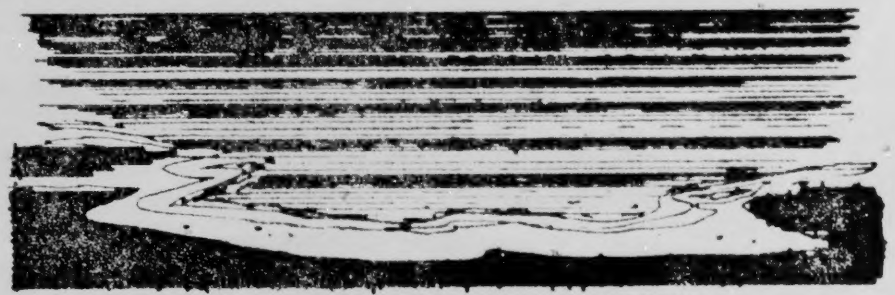
Soil



ANSWERS TO QUESTIONS ON SOIL

S-1	True	S-13	No	S-25	False
S-2	False	S-14	False	S-26	True
S-3	c	S-15	c	S-27	True
S-4	c	S-16	True	S-28	False
S-5	Yes	S-17	True	S-29	False
S-6	False	S-18	False	S-30	False
S-7	False	S-19	True	S-31	False
S-8	False	S-20	False	S-32	True
S-9	False	S-21	False	S-33	True
S-10	False	S-22	False	S-34	Yes
S-11	True	S-23	False	S-35	b
S-12	False	S-24	True	S-36	Yes

Water

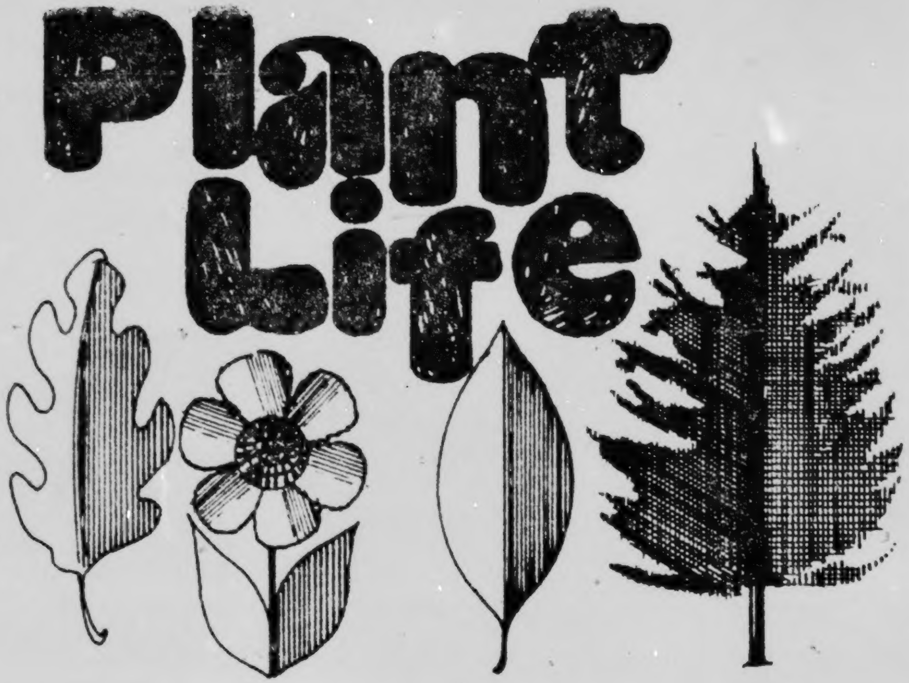


ANSWERS TO QUESTIONS ON WATER

W-1	d	W-13	False	W-25	b
W-2	False	W-14	False	W-26	c
W-3	True	W-15	False	W-27	False
W-4	False	W-16	c	W-28	True
W-5	b	W-17	a	W-29	c
W-6	c	W-18	c	W-30	False
W-7	False	W-19	b	W-31	True
W-8	True	W-20	c	W-32	False
W-9	False	W-21	True	W-33	b
W-10	False	W-22	True	W-34	c
W-11	True	W-23	True	W-35	True
W-12	False	W-24	False	W-36	True

ANSWERS TO QUESTIONS ON AIR

A-1	True	A-13	False	A-25	c
A-2	True	A-14	True	A-26	False
A-3	False	A-15	True	A-27	True
A-4	True	A-16	False	A-28	True
A-5	a	A-17	True	A-29	False
A-6	c	A-18	False	A-30	True
A-7	True	A-19	False	A-31	False
A-8	True	A-20	False	A-32	True
A-9	True	A-21	False	A-33	True
A-10	False	A-22	False	A-34	False
A-11	False	A-23	b	A-35	c
A-12	False	A-24	b	A-36	a



ANSWERS TO QUESTIONS ON PLANT LIFE

P-1	c	P-13	False	P-25	False
P-2	c	P-14	False	P-26	b
P-3	a	P-15	False	P-27	b
P-4	b	P-16	b	P-28	b
P-5	b	P-17	Yes	P-29	a
P-6	False	P-18	False	P-30	a
P-7	True	P-19	False	P-31	Yes
P-8	False	P-20	False	P-32	b
P-9	c	P-21	False	P-33	b
P-10	a	P-22	b	P-34	a
P-11	False	P-23	c	P-35	b
P-12	True	P-24	True	P-36	c

READ ALOUD
P-1
2 points

Plants are valuable to man because they give us

a. Carbon dioxide
b. Oxygen
c. Oxygen, food, and beauty

READ ALOUD
P-2
2 points

Most of the earth's oxygen comes from

a. Air and light
b. Trees
c. Plants that live in water

READ ALOUD
P-3
1 point

Forest fires are caused

a. Mostly by people
b. Mostly by nature
c. Mostly by lightning

READ ALOUD
P-4
2 points

Suppose the wind keeps blowing away soil. Which is the best way to hold down the soil?

a. Always keep the ground wet
b. Plant grass
c. Stamp on the ground to keep it hard

READ ALOUD
P-5
2 points

Young seedlings should be planted in the shade

a. Because they don't like sunlight
b. Because this will save water around the seedling
c. Shady soil has more fertilizer in it.

READ ALOUD
P-6
1 point

If there were no plants in the world, people would learn to live without them.

True or False?

READ ALOUD
P-7
1 point

Plants can take in carbon dioxide, sunlight, and water and give off oxygen.

True or False?

READ ALOUD
P-8
2 points

After a plant dies it loses all its value.

True or False?

READ ALOUD
P-9
1 point

Forest workers sometimes burn up materials on the floor of the forest

a. To make the area clean
b. To make the area worm in winter
c. To allow seeds to take root and grow

READ ALOUD
P- 10
2 points

If you placed a few small fish and some water plants in a bottle

a. Each would help the other to live
b. The fish would eat up the whole plant
c. The plant would poison the water

READ ALOUD
P- 11
1 point

If a fire burns down all the trees in a forest, they will all grow back to the same size in about ten years.

True or False?

READ ALOUD
P-12
2 points

Some materials such as dust are safe to breathe (in small amounts). But it the dust covers the leaf of a plant, the leaf may die.

True or False?

READ ALOUD
P-13
1 point

Only large trees produce oxygen. Small house plants use up oxygen.

True or False?

READ ALOUD
P-14
2 points

All bug killers used by farmers are safe. They can be eaten by human beings, and will never cause illness.

True or False?

READ ALOUD
P-15
1 point

People who own forest where trees are grown for lumber always cut down young trees because they are strongest.

True or False?

READ ALOUD
P-16
2 points

Which parts of a tree are useful to man?

a. the leaves

b. the trunk

c. the roots

READ ALOUD
P-17
2 points

Can old paper be used again to make new paper?

True or False?

READ ALOUD
P-18
1 point

It is all right to cut down as many trees as you wish, as long as you plant a new tree for each one you cut down.

True or False?

READ ALOUD
P-19
1 point

The early miners always took good care of trees where they looked for gold.

True or False?

READ ALOUD
P-20
2 points

Places that had forest fires never have floods because the ashes (burned wood) soak up water.

True or False?

READ ALOUD
P-21
2 points

Sometimes smog is good for plants because the smog kills insects.

True or False?

READ ALOUD
P-22
1 point

Trees make a place

- a. Warmer
- b. Cooler
- c. More dry

READ ALOUD
P-23
1 point

Farmers should allow their animals to eat:

- a. As much grass as they wish
- b. Only one third of the grass
- c. Only a certain amount of grass, to make sure that the grass will not die off

---

READ ALOUD
P-24
1 point

Sugar, corn, paper, and bread are all made from plants.

True or False?

READ ALOUD
P-25
2 points

If all the grass and trees in a large area were taken away, the climate (temperature and moisture) would still remain the same.

True or False?

READ ALOUD
P-26
1 point

Our national forests are kept mainly for

- a. Safety
- b. All year-round enjoyment by everyone
- c. Selling trees at a profit

READ ALOUD
P-27
2 points

The biggest danger to forests is

- a. Lightning in summer storms
- b. Careless people
- c. Wood-eating insects

READ ALOUD
P-28
1 point

If the bark of a tree is cut, the tree

a. Will always die
b. May be attacked by insects
c. Should be cut down and used

READ ALOUD
P-29
2 points

Many things that were once made of wood are now made of plastic because

a. Plastic is cheaper and often works just as well as wood
b. People don't like wood
c. Wood can burn

READ ALOUD
P-30
1 point

Bark and leaves that fall off a tree

a. Help to feed the tree
b. Are of no use to the tree
c. May poison the tree

READ ALOUD
P-31
2 points

Animals eat grass, and we eat animals. Can we become sick from eating animals that ate grass that was sprayed with too much of a dangerous chemical?

Yes or No?

READ ALOUD
P-32
2 points

The main reason for taking good care of our forests is to make sure that

a. They will always be neat and beautiful
b. There will always be forests
c. There is always a cheap supply of wood

READ ALOUD
P-33
2 points

What happens when a flood or forest fire ruins a forest?

a. The price of wood goes down because there is a lot of damaged wood to get rid of
b. The price of wood goes up because there is less wood, and many people need wood

---

READ ALOUD
P-34
2 points

Before the early explorers came to America

a. There were more trees than there are now
b. There were fewer trees than there are now
c. Indians ruined forests because they didn't know how to take care of them

---

READ ALOUD
P-35
1 point

The oldest living things in the world are

a. Crocodiles and alligators
b. Big trees
c. Skeletons

READ ALOUD
P-36
1 point

The largest living things in the world are

a. Whales
b. Dinosaurs
c. Big trees

READ ALOUD
W-1
1 point

Water is important for:

a. People to drink
b. Growing crops
c. Factories
d. All of the above

READ ALOUD
W-2
2 points

If the sun shines on water, the water will always be safe to drink.

True or False?

READ ALOUD
W-3
1 point

Water in rivers, lakes, and ponds sometimes has tiny living things in it.

True or False?

READ ALOUD
W-4
2 points

All cities and towns in the United States have all the water they need.

True or False?

READ ALOUD
W-5
1 point

Some factories dump chemicals into nearby rivers; lakes, or streams. This is:

a. Usually good for the water
b. Usually bad for the water
c. All right if no one finds out

READ ALOUD
W-6
1 point

Garbage that is dumped into water

a. Always floats
b. Always sinks to the bottom
c. Uses up oxygen in the water

READ ALOUD
W-7
2 points

If water is bad to drink, there is nothing you can do about it. That water will always be bad to drink.

True or False?

READ ALOUD
W-8
2 points

People who live in cities where there are many machines to help do the work, and many factories, use, and waste, the most water:

True or False?

READ ALOUD
W-9
2 points

Since water comes from the sky, it is always free, wherever you live.

True or False?

READ ALOUD
W-10
1 point

All kinds of garbage should be dumped into lakes to feed the fish.

True or False?

READ ALOUD
W-11
2 points

Parts of San Francisco Bay are so polluted that you are not allowed to swim in them.

True or False?

READ ALOUD
W-12
2 points

If a lake is polluted and all the fish have died, all you have to do is put in chemicals, and the lake will come back to the way it was before.

True or False?

READ ALOUD
W-13
2 points

After water comes out of a city's sewers, the water can never be used again.

True or False?

READ ALOUD
W-14
2 points

Most Western water comes from deep wells (holes dug in the ground).

True or False?

READ ALOUD
W-15
1 point

All parts of the United States have plenty of rain all year round.

True or False?

READ ALOUD
W-16
1 point

A dam is:

a. Filled to the top most of the time
b. Used mainly for water
c. Used to hold water

READ ALOUD
W-17
1 point

Sometimes people are not allowed to come near lakes where drinking water is stored because:

a. People often pollute water
b. People fish in the water
c. People park cars near the water

READ ALOUD
W-18
2 points

If soap suds get into rivers and lakes, the soap suds may

a. Keep the fish clean
b. Keep the water clean
c. Kill fish and plants

READ ALOUD 2 points
W-19

Farmers want their crop water to

a. Have plenty of salt, because cows like salt
b. Be as pure as possible
c. Have leftover fertilizer from other farms

READ ALOUD 2 points
W-20

We build dams and canals

a. Mainly for water sports
b. Only for drinking water
c. To save water and send the water where it is needed

READ ALOUD 2 points
W-21

When river water runs over rocks, oxygen mixes with the water. This helps to make the water pure.

True or False?

READ ALOUD 1 point
W-22

A few years ago there was such a bad water shortage in New York City that waiters in restaurants didn't give people a glass of water unless they asked for one.

True or False?

READ ALOUD 2 points
W-23

Water that goes into the soil in California may someday fall as rain in Mexico

True or False?

READ ALOUD 2 points
W-24

If people in other cities waste their water, that is their problem. Their wasting of water will never hurt my city.

True or False?

READ ALOUD 1 point
W-25

Some lakes in the United States

a. Have fish that eat soap suds
b. Have lost all their fish because of water pollution
c. Have fish that live on smog

READ ALOUD 1 point
W-26

Some power plants put warm water into the ocean.

a. This helps to keep fish warm
b. This will never cause a problem.
c. This may kill fish in the nearby waters.

READ ALOUD 1 point
W-27

When water is polluted, only the people who live near that water have a problem.

True or False?

READ ALOUD
W-28
2 points

There are lasws against putting certain materials into rivers, lakes, streams, bays, and the ocean.

True or False?

READ ALOUD
W-29
1 point

If oil leaks from an underwater well

a. All the oil can be cleaned up
b. This is a good because oil keeps water from being rough
c. Birds, fish, and plant life the area may be killed

READ ALOUD
W-30
1 point

We don't have to worry about using up our fresh water because we can get all the water we need from the ocean, and it won't cost us any money.

True or False?

READ ALOUD
W-31
2 points

Some organic material in garbage can be eaten by sea animals.

True or False?

READ ALOUD
W-32
2 points

When human beings dump materials into water, nature always solves the problems this causes.

True or False?

READ ALOUD
W-33
1 point

Where are you most likely to find pure water?

a. Around small cities
b. In the country and in mountain areas
c. Near most large cities

READ ALOUD
W-34
1 point

To find out whetehr water is saft to drink, you

a. Only have to smell it
b. Taste a little
c. Test it scientifically

READ ALOUD
W-35
2 points

The water in some rivers in the United States is so bad that if you drink it, you can become very ill.

True or False?

READ ALOUD
W-36
2 points

In some places, the drinking water has a strange taste because materials are put in the water to make it safe to drink.

True or False?

READ ALOUD
S-1
2 points

The leaves or pine needles that fall off a tree are good for the soil.

True or False?

READ ALOUD
S-2
1 point

Trees in a forest often cause erosion.

True or False?

READ ALOUD
S-3
1 point

Which is most likely to have erosion?

a. A city street
b. A swamp
c. A burned down forest

READ ALOUD
S-4

Why are bushes and trees planted along roads?

a. To give shade
b. Only for beauty
c. To prevent erosion and for beauty

READ ALOUD
S-5
1 point

Can sewage from cities be sued to improve soil?

Yes or No?

READ ALOUD
S-7
2 points

Sometimes fertilizer from one area is carried by water to another area. This is always good for the second area.

True or False?

READ ALOUD
S-7
1 point

What is the best thing to do with a gold mine that is no longer used?

a. Charge admission to people who want to see it
b. Fill it with earth (soil)
c. Forget about it

READ ALOUD
S-8
2 points

When plants grow in soil, they do not take anything out of the soil.

True or False?

READ ALOUD
S-9
2 points

Good soil can be used over and over again, and it will always be good. You nver have to add anything to it.

True or False?

READ ALOUD
S-10
2 points

The more animals you put in a grass area, the better it is for the soil?

True or False?

READ ALOUD
S-11
1 point

Plants are good for soil because their roots keep the soil from being blown away by the wind or carried away by water.

True or False?

READ ALOUD
S-12
2 points

If soil is poor, there is nothing you can do to improve it.

True or False?

READ ALOUD
S-13
2 points

Was there more good soil in the United States 350 years ago than there is now?

Yes or No?

READ ALOUD
S-14
1 point

It takes only a few years for nature to make soil.

True or False?

READ ALOUD
S-15
2 points

What is the best way to be sure we will always have enough good soil?

a. Bring soil back from the moon
b. Keep using a lot of fertilizer
c. Treat the soil we have very carefully

READ ALOUD
S-16
1 point

Wastes from a city dump can be added to soil to make parks.

True or False?

READ ALOUD
S-17
1 point

After it is treated, sewage (liquid waste) can be used to make parks.

True or False?

READ ALOUD
S-18
1 point

The early miners in the West always took good care of the soil.

True or False?

READ ALOUD
S-19
2 points

"Tailings" are piles of rocks and soil left by gold miners.

True or False?

READ ALOUD
S-20
1 point

If soil is poor, you will never be able to grow anything in it.

True or False?

READ ALOUD
S-21
1 point

If soil is poor, all you have to add is water to improve it.

True or False?

READ ALOUD
S-22
2 points

In the West, most of the soil that is good for growing things is in the desert.

True or False?

READ ALOUD
S-23
1 point

In the West, most crops are raised in the desert because land is cheap there.

True or False?

READ ALOUD
S-24
2 points

In the West, most crops are raised near cities and towns becasue that is where the water is.

True or False?

READ ALOUD
S-25
1 point

Good soil always contains metal and glass.

True or False?

READ ALOUD
S-26
2 points

Good soil slways contains organic material.

True or False?

READ ALOUD
S-27
1 point

Organic material in soil often comes from plants or animals.

True or False?

READ ALOUD 2 points
S-28

The more water you put into soil, the better it is for the soil.

True or False?

READ ALOUD 2 points
S-29

Erosion of soil is caused only by the wind.

True or False?

READ ALOUD 2 points
S-30

Soil erosion is caused only by water.

True or False?

READ ALOUD 1 point
S-31

There is so much good soil in the United States that we do not have to worry about saving it.

True or False?

READ ALOUD 1 point
S-32

Poor soil can sometimes be improved by adding fertilizer.

True or False?

READ ALOUD 2 points
S-33

Fertilizer is made up of materials from plants or animals, or sometimes manufactured by man to improve the soil.

True or False?

READ ALOUD 1 point
S-34

Did the early miners ever wash away mountain sides to get gold?

Yes or No?

READ ALOUD 1 point
S-35

Which of these protects soil from erosion?

a. Metal
b. Plants
c. Cows

READ ALOUD 1 point
S-36

Is it possible to add too much fertilizer to soil?

Yes or No?

READ ALOUD
A-1
2 points

Pure air is invisible (you can't see it).

True or False?

READ ALOUD
A-2
2 points

The word "smog" comes from a combination of the words "smoke" and "frog."

True or False?

READ ALOUD
A-3
1 point

The world has all the pure air it needs.

True or False?

READ ALOUD
A-4
2 points

The air in some cities became so polluted at certain times that it killed many people.

True or False?

READ ALOUD
A-5
2 points

Smog is usually worst

a. In the daytime
b. At night
c. In the middle of the night

READ ALOUD
A-6
2 points

Smog is caused by

a. Air pollution and fog
b. Air pollution and smoke
c. Air pollution and sunlight

READ ALOUD
A-7
1 point

Smog can ruin the paint on houses and cars.

True or False?

READ ALOUD
A-8
1 point

Smog can cause runs in women's stockings.

True or False?

READ ALOUD
A-9
1 point

Smog can kill plants and trees

True or False?

READ ALOUD 1
A-10 point

When there is smog and your eyes itch, the cause is usually dust in the air.

True or False?

READ ALOUD 2
A-11 points

Most smog is caused by cars. Only a small amount is caused by factories and industry.

True or False?

READ ALOUD 1
A-12 point

Smog usually gets blown away and falls into the ocean.

True or False?

READ ALOUD 1
A-13 point

Some of the things in smog are good for your health.

True or False?

READ ALOUD 1
A-14 point

A car with smoky exhaust always makes a smog problem worse.

True or False?

READ ALOUD 2
A-15 points

There are laws that require car makers to help solve the smog problem.

True or False?

READ ALOUD 2
A-16 points

If you live in some cities, you are allowed to burn a small amount of trash in your back yard any time.

True or False?

READ ALOUD 2
A-17 points

Factories and industries cause more smog problems than cars.

True or False?

READ ALOUD 2
A-18 points

There is nothing that factories and industries can do to solve smog problems.

True or False?

READ ALOUD 1 point
A-19

Some experts believe that cars cause 99 percent of our smog problems.

True or False?

READ ALOUD 1 point
A-20

Pine trees are not hurt by smog.

True or False?

READ ALOUD 1 point
A-21

People with poor lungs and breathing problems are never bothered by smog because they are given special medicines.

True or False?

READ ALOUD 2 points
A-22

When smog attacks your lungs, you can always solve the problem by breathing faster and taking in more oxygen.

True or False?

READ ALOUD 2 points
A-23

One of the most harmful materials in smog is a gas called

a. Aorgone
b. Ozone
c. Organic

READ ALOUD 2 points
A-24

In some areas, cold air gets trapped above a city. The warm air tries to rise, but it can't get through the cold air. This problem is called

a. Smog alert
b. Temperature inversion
c. Poor visibility

READ ALOUD 2 points
A-25

Dirty air can harm plants

a. Only if the air touches the plant
b. Only if material falls out of the air onto the plant
c. If either of the above happens

READ ALOUD 1 point
A-26

Most of the time, smog makes the air look purple.

True or False?

READ ALOUD 2 points
A-27

Most of the time, smog causes air to look yellow-brown.

True or False?

READ ALOUD
A-28
1 point

Sometimes material from factory smoke gets into the bodies of cows. The cow's bones become so weak that the cows cannot stand up.

True or False?

READ ALOUD
A-29
5 points

Nature has made sure that young babies are not hurt by polluted air

True or False?

READ ALOUD
A-30
1 point

If air has a color to it, this is sign that the air is not pure.

True or False?

READ ALOUD
A-31
2 points

Trees always put enough oxygen into the air to make the air pure.

True or False?

READ ALOUD
A-32
1 point

In large cities, car tires sometimes become cracked because of smog.

True or False?

READ ALOUD
A-33
2 points

In some cities, when the smog becomes very bad, only hospitals, drug stores, and food stores may remain open.

True or False?

READ ALOUD
A-34
2 points

In most States if there is a bad smog attack, you may still drive to work if there are no buses between your home and work.

True or False?

READ ALOUD
A-35
1 point

Since cars cause smog, the problems must be solved by

a. Car makers
b. Gasoline makers
c. Both of the above

READ ALOUD
A-36
2 points

Much of the material in smog is

a. Fuel that is not burned up
b. Yellow light
c. Fog

THE ECOLOGY GAME

HOW TO PLAY

1. Place your marker on the "Start" position. Everyone should begin with a score of 5 points. To see who goes first, roll the die. The person with the highest number takes the first turn.

2. When it is your turn, roll the die, and move your marker the same number of spaces as the number on the die. If the space you land on says "Win 1", add 1 point to your score. If it says "Lose 1," subtract 1 point. If the space you land on has a star, draw a question card from the Soil, Water, Air, or Plant Life piles in the center of the board.

3. When you have drawn a question card, read it aloud, and try to answer the question. Then turn it over and bury it in the deck again. The "Expert" will look up the right answer and tell you if you were correct. For each right answer you give, add 5 points to your score. For every wrong answer, subtract 1 point.

4. Your group should play for 30-45 minutes. When the teacher calls out "Time," the scorekeeper will add up the scores. The person with the highest score wins the game.

ECOLOGY GAME SCORESHEET

Instructions:

1. All players start with 5 points.
2. Write the name of each player in the order that he moves.
3. If the player answers correctly, cross out his old score and write in the new score.

	Player 1	*Player 2*	*Player 3*	*Player 4*	*Player 5*	*Player 6*
Name	______	______	______	______	______	______
	5	5	5	5	5	5

Exercise 2. A Few Facts About Ecology

The reading on pp. 40-43 introduces two key concepts which underlie the material which will be presented later. They are the idea of ecology as a study, and the importance of cyles in nature. There are also several terms which will be mentioned in later Activities, and which students should know. These are: environment, minerals, carbon dioxide, and bacteria.

Reproduce and give to students the reading on pp. 40-43 , or read this material aloud. If you read it, you may wish to make a transparency of the drawing on p. 41 or show it on an opaque projector. Explain how each thing pictured is related to the others.

When you have finished, discuss each of the terms listed above with the class. Some points which might be made in the discussion are:

1. Ecology

   Ask students if they think that "ecology" could include the study of cities as well as of the countryside. They may have the idea that it only refers to natural conditions. Note that one of the things that ecologists study is the way living creatures react to changes around them.

2. Cycles

   Discuss examples of different cycles with which students may be familiar. These could include the seasons, the school year, the life cycle, etc. It should be pointed out that traditional Indian societies tended to think of life as a series of cycles rather than as a linear progression, as Europeans do. Life was geared to the circle of the year, and activities, ceremonies, etc., depended on its progression. *The Lost Universe* (Pawnee), and *The Book of the Hopi* provide fascinating descriptions of two very different Indian ceremonial cycles.

3. Environment

   Although people tend to talk about "the environment," this is actually a term which only has meaning when used in relation to a specific creature, group, etc. Ask students how they would describe their current environment--the school.

4. Minerals, Carbon Dioxide, Bacteria

   These items are better shown than discussed. If you have access to lab. facilities, use them to demonstrate the existence of carbon dioxide and bacteria, and point out different kinds of minerals with which students are familiar. Or, you may refer to work previously done in class. Note that some bacteria are helpful, but some can cause disease.

EXERCISE 2. A FEW FACTS ABOUT ECOLOGY

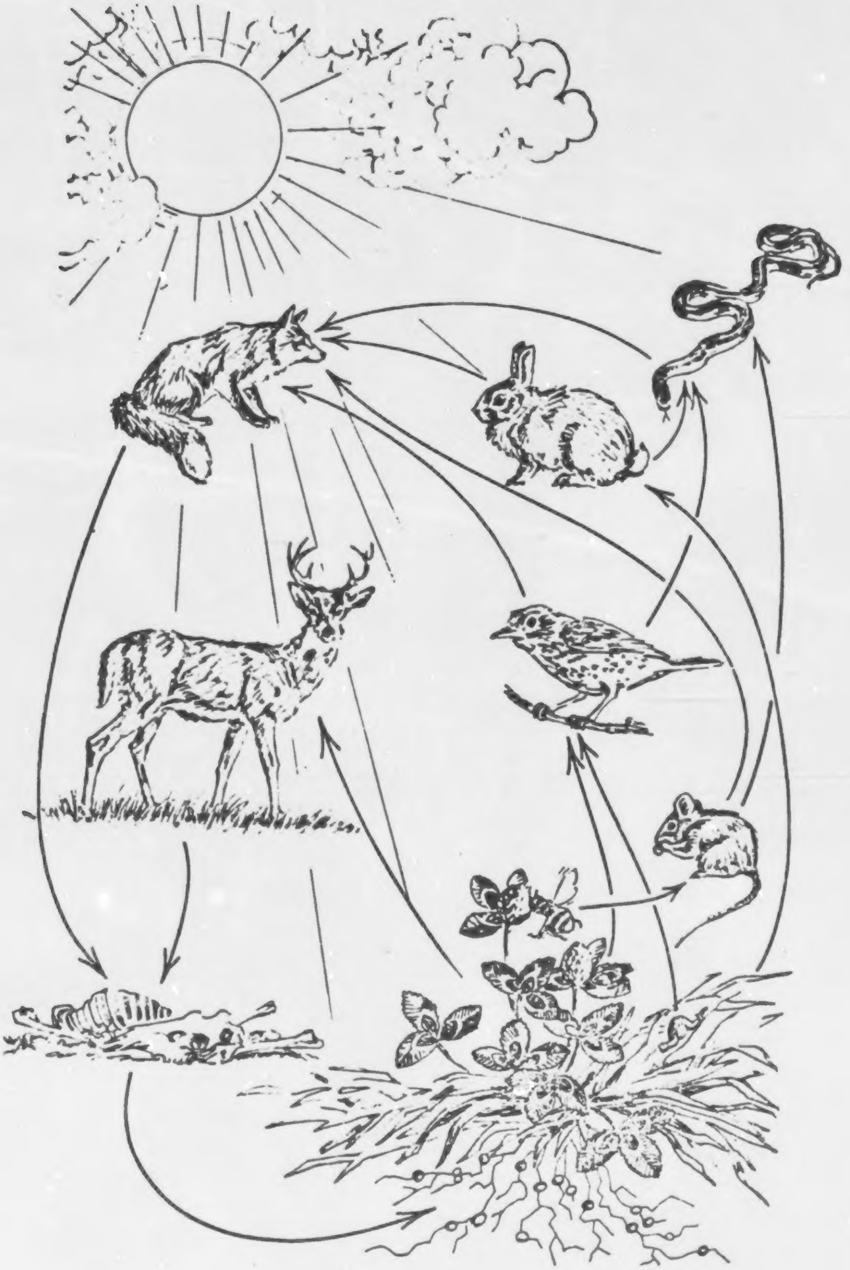
The word *ecology* is being used quite a lot these days. Your grandparents might not have heard the word when they were young, they would not have known the words *astronaut* or *lunar module*, either. These are words of the space age in which we now live. It is the space age and all that goes with it that have made *ecology* an important word to understand.

The word *ecology* comes from two Greek words that together mean *study of the home*. *Ecology* today is the science that deals with the ways that the different parts of nature fit together. People, animals, and plants are the living parts of nature. Sunlight, air, minerals, soil, and water are the non-living parts. To make life possible on earth, all these different living and non-living parts have to work together in a *cycle*.

A *cycle* is something that goes around in a circle. Before it can end, a cycle has begun again.

Look at the picture on the next page. It shows how the different parts of nature can work together in a cycle.

FOOD CHAIN



When people do things that break the cycles in nature it causes problems. For example, plants in a lake use the sunlight to help them digest things in the water (like minerals and bits of food) and use them to build their own bodies--that is, to grow. This is the same thing people do when they eat food. But while people breathe in oxygen and breathe out carbon dioxide, the plants give off oxygen, which fish and animals breathe. When the animals and plants in the lake die, what was in their bodies goes back into the water, to be used by more plants. This is a cycle, in which plants and animals each make the things the others need to live.

But what happens if man puts something into the lake that doesn't belong there? People dump garbage into the lake, and streams carry extra fertilizer down to it. Some of these things kill the life in the lake, but some of them are food for the plants--too much food. When this happens, so many plants grow that they keep the sunlight from getting through the water. The plants on the bottom die, and the bacteria that break down their bodies use up oxygen instead of producing it. Then there is none for the fish, and the fish die too. Either way, man has broken the cycle of nature.

WORDS TO KNOW

Ecology--	the science that deals with the ways that different parts of nature fit together.
Cycle--	something that goes around in a circle, a series of events, each one of which is necessary to the next one, and which is repeated again and again.
Environment--	all the conditions, circumstances, and influences surrounding and having an effect on a living thing.
Minerals--	different kinds of rocks and other things found under the earth which each have their own color, hardness, and other characteristics.
Carbon Dioxide--	an invisible gas in the air. Animals breathe it out, and plants take it in.
Bacteria--	tiny creatures so small they can only be seen through a microscope. They help turn dead plants and animals into soil.

Exercise 3. Review

When students have finished with the reading and discussion, reproduce, write on the board, or read to them the review questions on page 45 . Sample answers are provided on page 46 . You may give or read these answers to them so that they can check their work. Be sure and make clear that in most cases these sample answers indicate the kinds of answers students should give, not the exact wording.

Additional Activities

Audio-visual and other resources which would be appropriate for use with this activity are listed on p. 143 of this book. Distributors are listed on p. 156 The materials listed here are not the only one which could be used with this unit--if you do not have access to the ones listed, use them as examples of the kinds of materials to look for.

If such materials are available, and you have the time to use them, they can add a great deal to a unit such as this. Check your school's resource catalogue.

Other additional activities include visits to natural history museums which have exhibits showing life-cycles, environments, etc. If you are not using this unit in a science class, the science teacher might be invited to do some experiments which illustrate aspects of this or later activities for the class.

One additional activity which could be very useful in conjunction with this unit would be a field trip into a wild area. If this might be possible for your class, you should begin planning for it now. Include students in the planning process, and as you progress through the unit, have them note concepts and phenomena from each activity which they can look for on the trip.

EXERCISE 3. REVIEW

1. What is ecology?

2. Describe one cycle in life which you know about, or draw a picture which shows how it works:

3. List four things that you need in your environment:

   Example: food

   a.

   b.

   c.

   d.

4. True or False?

   a. Wood is a mineral. T F

   b. Plants produce oxygen. T F

   c. People eat some minerals. T F

   d. Bacteria are not really necessary. T F

   e. Each kind of mineral is different in some way from each other kind. T F

EXERCISE 3. REVIEW

1. What is ecology?

   The science that deals with the ways different parts of nature fit together.

2. Describe one cycle in life which you know about, or draw a picture which shows how it works:

   Any answer or picture which indicates that each part of a cycle leads to the next, and that cycles are repeated is correct.

3. List four things that you need in your environment:

   Example: food

   a. *air, water, shelter, friends, things to do,*
   b. *clothes, etc., are all possible answers.*
   c.
   d.

4. True or False?

   a. Wood is a mineral. T [✓ F]
   b. Plants produce oxygen. [✓ T] F
   c. People eat some minerals. [✓ T] F
   d. Bacteria are not really necessary. T [✓ F]
   e. Each kind of mineral is different in some way from each other kind. [✓ T] F

Activity 2. What Do We Need?

GOAL:	To help students understand basic human needs
OBJECTIVE:	Students will give examples of how people meet their needs in a traditional Indian home and how some people meet their needs today.

WHAT STUDENTS WILL BE ASKED TO DO

- Read an analysis of a human community's basic needs
- Think of things that fill each need
- Examine a picture of a traditional Indian home and identify what needs are met by the things in the picture
- Examine a picture of a living room in a modern house and identify what needs are met by the things in the picture

MATERIALS NEEDED

- Pencil and paper
- Any materials required for additional activities you may choose

PROCEDURE

Before we can understand how man uses resources, we must understand what he needs to live. There are relatively small numbers of basic needs which must be met for a human community to survive. The resources available to a community to fill these needs make up their environment. The way they use these resources is part of their culture, for although man's needs are basically the same, there are almost as many styles of meeting them as there are societies.

In this Activity, students will be identifying basic needs and comparing ways they are met in at least one traditional Indian setting and in a modern American home.

If your students have had Unit #1 of this series, "Part of the Whole World," you may find it useful to refer back to the material on culture and environment discussed there in introducing this activity.

Exercise 1. What Do We Need?

The purpose of this exercise is to make students aware of the basic kinds of things that all people need to exist. If students have already studied other units in this series in which basic needs have been discussed, you may feel it sufficient to briefly review the four basic need areas and the need they include, before going on to Exercise 2.

However, if students have not encountered the concept of basic needs before, reproduce and give to students pp. 49-51 in this book, which describes these needs.

When students have had a chance to read the material, ask students what the basic needs are, and write them on the board as they reply. Then assign one or more of them to each workgroup, and ask students to suggest several things that could be used to fill it. For instance, the need for transportation might be filled by cars, horses, airplanes, walking, etc. Give workgroups five to ten minutes to come up with ideas, then ask group spokesmen to tell the class what they thought up. Write the suggestions on the board next to the needs they would fill.

WHAT DO WE NEED?

Once a leader of the Cayuse tribe, who was called Young Chief, refused to sign a treaty. He said nobody had asked the land itself whether it wanted to belong to the White men. Then he said--

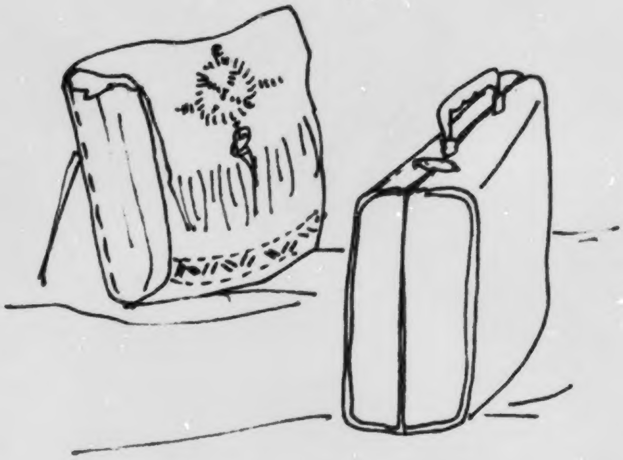
> "The ground says, 'It is the Great Spirit that placed me here. The Great Spirit tells me to take care of the roots to feed the Indians on.' The water says the same thing. 'The Great Spirit directs me, feed the Indians well.'... The ground says, 'The Great Spirit placed me here to produce all that grows on me, trees and fruit.' The same way the ground says, 'It was from me man was made.' The Great Spirit, in placing men on earth, desired them to take good care of the ground and to do each other no harm."

In this speech, Young Chief told how he thought man and the rest of the world should fit together. He also was talking about what may be the most important need of people (or any other living thing), *FOOD*.

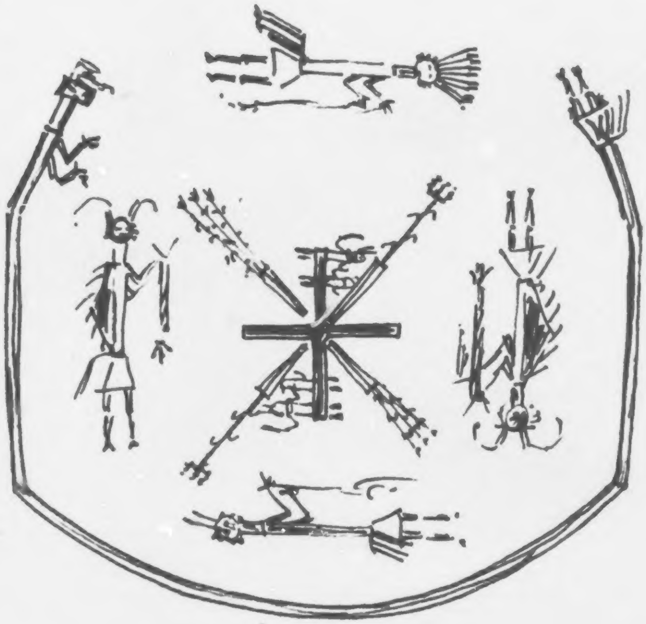
People can eat a great many kinds of things. Grains, fruits, nuts, vegetables can be grown in fields, or gathered in the wilderness. Animals can be hunted or raised. Men also need a certain amount of salt, and, of course, they need water to drink.

Probably the next need you think of is clothing. But the need for clothing depends on where you live. In the cold Arctic, the Eskimos wear furs. In the hot jungle, people often wear nothing at all. But everyone needs some protection from the weather--some *shelter*. Shelter can be defined as anything that keeps you from freezing to death, getting wet, or getting too hot. The word *shelter* can be meant as *clothing*, all kinds of *houses*, and also the fire or other means of heating. Since it goes in the house *furniture* probably should be placed in this category too.

However, in order to get food and shelter, all men make some kinds of tools or *aids*. An aid is anything besides your own body that you use to make or do something. So a digging stick, a wagon, a sewing machine, a truck, a stewpot, an axe, a horse, a harpoon are all aids.



Another need is security. This means protecting people from enemies. It includes the government that keeps things going. It also includes medicines which stop disease. Whatever makes people feel safe is part of their security. For example, people's ceremonies and religions--with symbols and equipment to protect them against dangers or to bring them into harmony with the spiritual world--are sometimes part of security. One might even put toys and other sources of entertainment here since they help people feel happy and safe. Making things beautiful--art--also helps people feel at home in the world.



Exercise 2. Meeting Needs in a Traditional Home

When you have finished with the discussion of what basic needs are, explain that the next activity will be to consider how needs were met in a traditional Indian home. Indian tribes in this country had many different ways of life, depending on the kind of country they lived in, their ideas and values, etc. For this exercise, students will be looking at only one of them, the Mandans who lived on the western prairies in the 19th century.

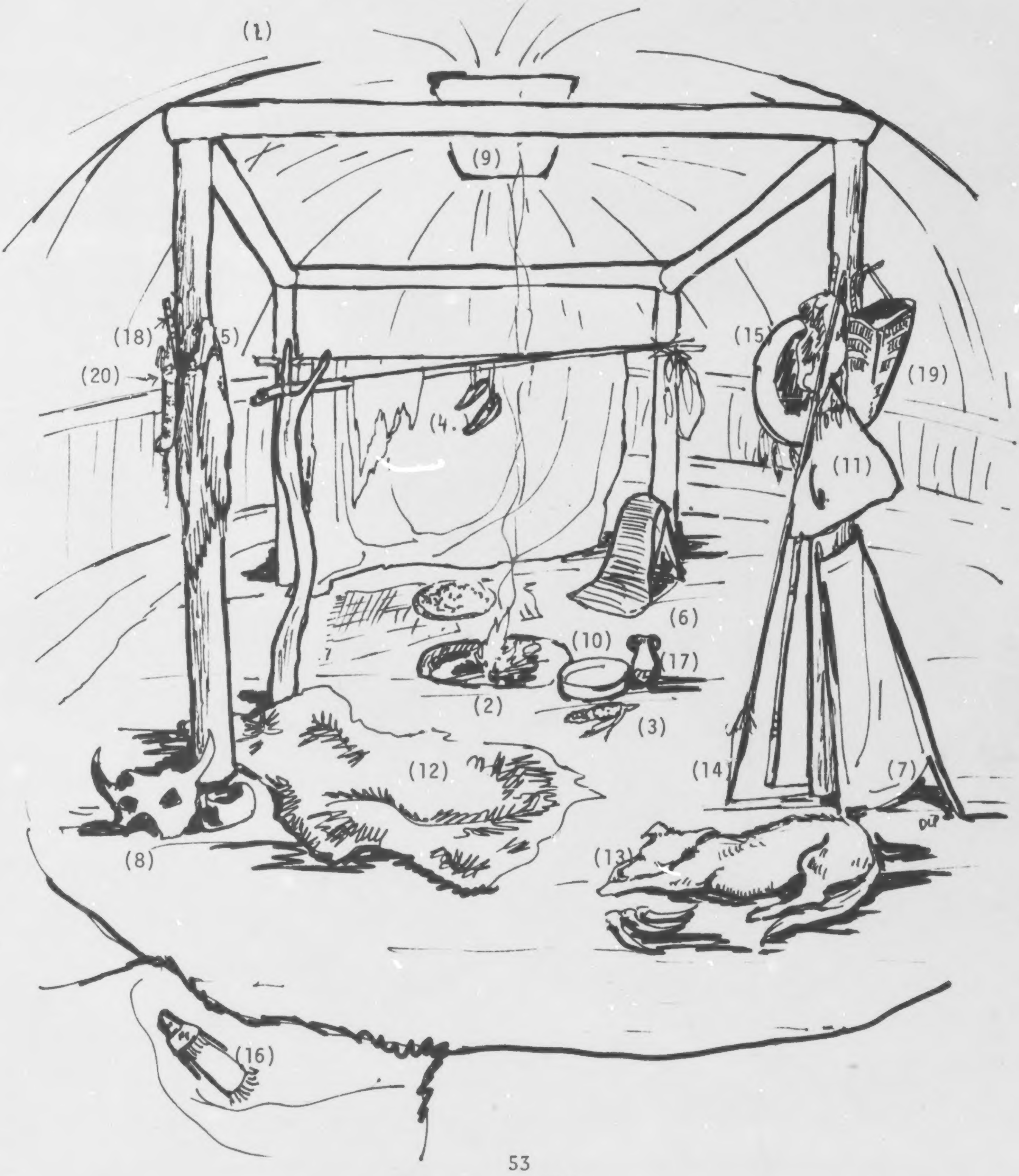
Reproduce and give to students copies of the picture on p. 53 of this Guide, and the list of things in it on p. 54.

Tell students that the picture shows the inside of a Mandan home, which was a type of house called an earthlodge, because it was made of earth packed tightly over a frame of poles. These houses were quite large and warm. The Mandans lived in villages of earthlodges, each holding a dozen or so people.

Ask students to look at the picture carefully. There are many objects in the earthlodge, each one of which was used by the people to meet one of the needs the class has just discussed. These objects are listed on the second piece of paper you have given them. Tell students their assignment will be to identify the need that each one of those objects probably filled. A format for the exercise appears on p. 55 . It can be reproduced as a worksheet, or simply suggested. On p. 56 are suggested answers for the exercise, you may have students correct their work by handing out copies of them, or by having students compare answers and discuss their reasoning, using these answers to guide your comments.

Collect the pictures after students have finished the exercise and make sure students keep their papers, as they will be needed again later.

Interior-- Mandan Earthlodge (19th cen.)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THE THINGS IN THE MANDAN HOME

1. The earthlodge
2. Fire for warmth and cooking
3. Corn
4. Moccasins drying over fire
5. Ceremonial shirt hanging from peg
6. Backrest made of reeds
7. Travois (used like a wagon)
8. Buffalo skull
9. Smokehole
10. Wooden bowl
11. Leather pouch for storing ceremonial items
12. Buffalo robe for sitting or sleeping
13. Dog to pull travois, bark at strangers, and eat scraps
14. Lance for hunting buffalo and fighting
15. Shield
16. Child's doll
17. Pottery waterbottle
18. Courting flute
19. Carrying basket
20. Ceremonial pipe in case

EXERCISE 2. MEETING NEEDS IN A TRADITIONAL HOME

What need does each thing in the Mandan earthlodge fill? (include everything on the list):

Thing in the Mandan home	Need it fills
Example: 1. the earthlodge	shelter

SAMPLE ANSWERS

EXERCISE 2

	Things in the Mandan Home	Need Area
1.	the earthlodge	*shelter (housing)*
2.	fire for warmth and cooking	*shelter (heat)*
3.	corn	*food*
4.	moccassins	*shelter (clothing)*
5.	ceremonial shirt	*security (religion)*
6.	backrest	*aids (furniture)*
7.	travois	*aid (transportation)*
8.	buffalo skull	*food (or possibly religion)*
9.	smokehole	*shelter (smoke but, light in)*
10.	wooden bowl	*aid*
11.	leather pouch for storing ceremonial items	*aid or security (religion)*
12.	buffalo robe	*shelter*
13.	dog	*aid (transportation) and security (defense)*
14.	lance	*aid (hunting) and security (defense)*
15.	shield	*aid and security (defense)*
16.	doll	*security (psychological)*
17.	waterbottle	*aid and food*
18.	courting flute	*security*
19.	basket	*aid*
20.	ceremonial pipe	*security*

Exercise 3. Meeting Needs in a Modern Home

In this exercise, students will be repeating the activities of exercise 2. This time, however, they will be dealing with a modern home. Point out that just as the different Indian tribes had many different kinds of meeting their needs, people today live in many different ways. Many Indians meet some of their needs in traditional ways. It is up to the individual to decide which way he or she likes best.

But for this exercise, the home being looked at will be the kind of house one might expect to find in an American city or town today.

Reproduce and give to students the picture of the modern living room, and the list of things it contains on pp. 58-59. Hand out or describe the format for the worksheet on p. 60, and give them the assignment. As before, it is to look at the picture and the list and then decide what need each of the items in the room meets.

After students have finished, use the sample answers on p. 61 to guide discussion of their choices. Note that some of the items may meet more than one kind of need. The television, for instance, may provide communication and education as will as entertainment.

Now encourage students to identify some of the similarities and some of the differences they have noticed in the ways people in the Mandan and the modern home meet their needs. A few of them, like the doll and the dog, may be almost exactly the same. Some, like the back rest and the chair, serve the same purpose. Others, like the television, the lance, the wedding pictures, and the travois, are very different. If students bring up the fact that the modern items are mostly machine-made, or made from different materials, tell them to take note of that, because it will become very important in the next two Activities.

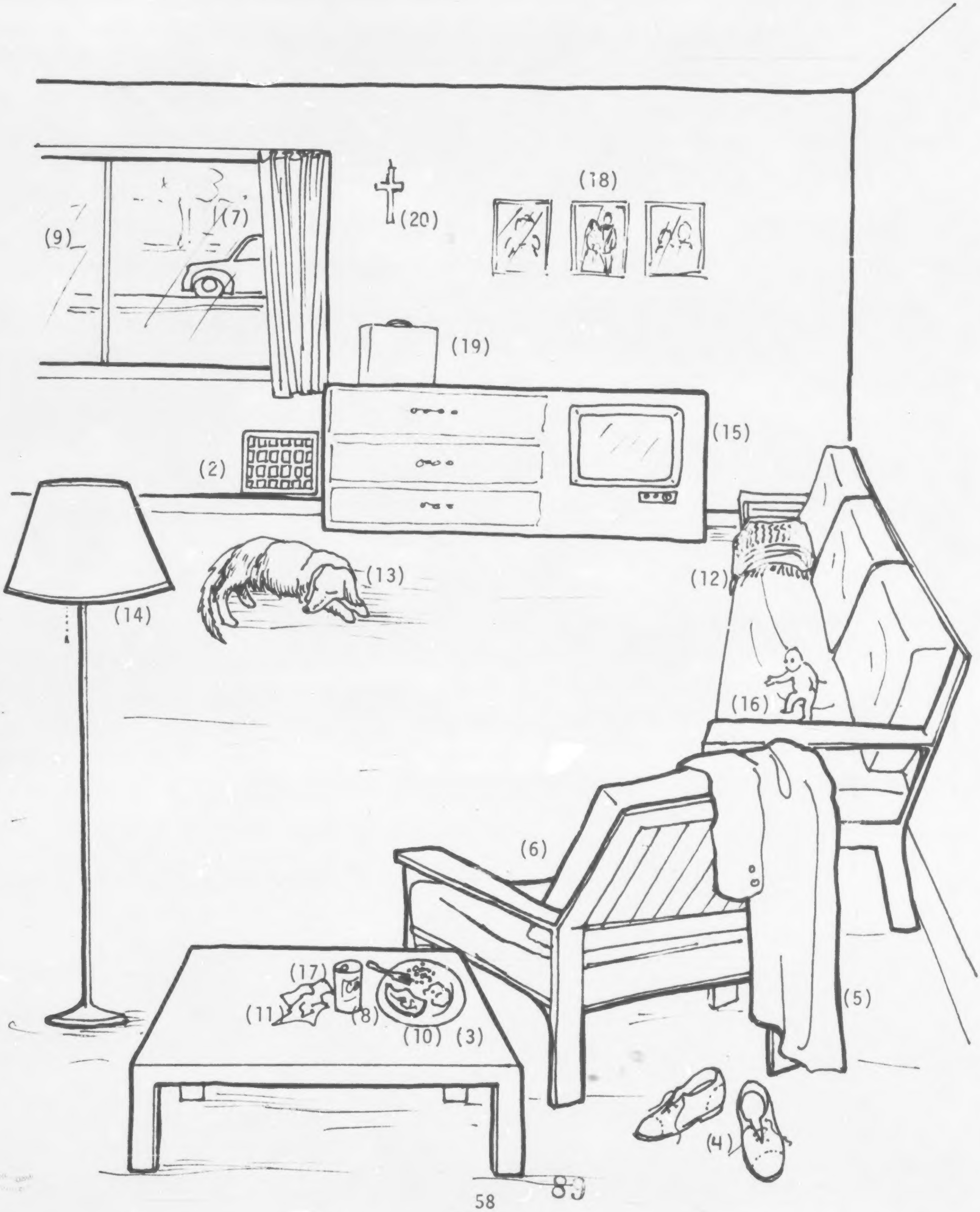
Collect the pictures after students have finished, and make sure they keep their papers, as they will be needed in later exercises.

Additional Activities

Assign workgroups to prepare reports on how different Indian tribes lived and met their needs. This activity could be extended into the preparation of a series of dioramas, or a display. Encourage students to note ways in which different tribes used the resources in their environments.

Arrange a field trip to a local museum which has displays on how different people live. The Heard Museum in Phoenix has a particularly good exhibit which shows how the predecessors of the Pueblo tribes used their environment. The Navajo Tribal Museum has a similar exhibit. Museums in large cities may have sections showing the life-styles of people in different countries. As you tour the exhibits, point out similarities among them, and also discuss the differences, and cultural or environmental factors that might cause them.

For audio-visual materials which might be useful at this point, see the Resource List on p. 143.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89

THINGS IN A MODERN HOME

1. The living room
2. Outlet for gas furnace
3. Mashed potatoes on a plate
4. Man's shoes
5. Coat
6. Chair
7. Car
8. Steak
9. Window
10. Porcelain plate
11. Paper napkin
12. Knitted laprobe
13. Watchdog
14. Lamp
15. Television
16. Child's doll
17. Coca Cola can
18. Wedding picture
19. Briefcase
20. Cross

EXERCISE 3. MEETING NEEDS IN A MODERN HOME

Thing in the Living Room	Need it fills
Example: 1. the living room	shelter

SAMPLE ANSWERS

EXERCISE 3

Things in Modern Home	*Need Area*
1. the living room	*shelter (housing)*
2. outlet for gas furnace	*shelter (heat)*
3. mashed potatoes	*food*
4. man's shoes	*shelter (clothing)*
5. coat	*shelter (clothing)*
6. chair	*aid (furniture)*
7. car	*aid (transportation*
8. steak	*food*
9. window	*shelter*
10. plate	*aid*
11. napkin	*aid*
12. laprobe	*shelter*
13. watchdog	*security (defense)*
14. lamp	*aid (furniture)*
15. television	*security, entertainment or aid (communication)*
16. doll	*security*
17. coca cola can	*aid*
18. wedding picture	*security*
19. briefcase	*aid*
20. cross	*security (religion)*

Activity 3. Getting What We Need

GOAL: To help students understand the importance of natural resources

OBJECTIVE: Students will give examples of how people in a traditional Indian home used resources to meet their needs and how people in a modern American home use these resources today.

WHAT STUDENTS WILL BE ASKED TO DO

- Read descriptions of the basic resources which support life
- Identify what resources were used to make each of the things in the traditional and in the modern home
- Read about the Balance of Nature
- Answer review questions based on the reading

MATERIALS NEEDED

- Pictures and exercises from Activity 2
- paper and pencil

PROCEDURE

Basic needs may be the same all over the world, but resource use differs drastically from traditional to technological community. In this Activity, students will be expanding the classification of resources suggested in the game in Activity 1, and analyzing how these resources are used to meet the needs first in the traditional Mandan home, and then in the modern city.

In the course of the analysis, it will become apparent that while the objects and equipment in the Mandan home are all made out of a fairly limited number of natural materials, in the city home, the items portrayed have been manufactured out of a wide variety of materials, some of them artificial, and most of them with considerable processing involved. In the course of this comparison, students will be encourages to begin thinking about where all these raw materials come from, and whether they can be renewed.

Exercise 1. Resources

The purpose of this exercise is to teach students what the basic resources in our world are. You may read the material on pp. 64-69 to students, or you may make copies of it and give it to them to read. If you have access to a film or slide-tape which covers this information, you may prefer to use it instead.

If your class is planning a field trip, suggest looking for examples of these resources as one of the things you might do on it. You might also have students draw or cut out magazine pictures of the various resources.

Exercise 2. Resources At Work

For this exercise, students will need the pictures of the Mandan and modern homes and lists of items in them used in the last Activity.

Remind students that people have the same basic needs, whether they live in a traditional village or in the city. But the ways in which they meet these needs and the things they use to do so are not the same. People use the seven basic resources described in Exercise 1 in many ways.

Tell students that things can be made from natural or man-made materials. Natural materials are things like wood or clay--things you can look at and tell what resource they came from (plant life, the earth, etc.). Man-made materials, like plastics, are made by putting things from many different resources together. By pointing to things in the classroom, referring to things students are familiar with, or showing pictures, given examples of things made from natural and man-made materials until you feel that students have grasped the distinction.

Now, pass out the pictures and lists from Activity 2 once more. Tell students that their assignment will be to take each item on the list, and tell what they think it was made from, and whether that material is natural or man-made. A worksheet format for the exercise is provided on pp. 70-71.

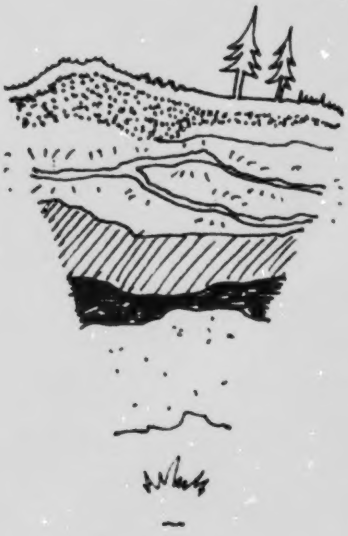
When students have finished, use the sample answers on pp. 72-73 to guide discussion of their answers. You may find it advicable to reproduce the sample answers and give them to students to correct their work.

EXERCISE 1. RESOURCES

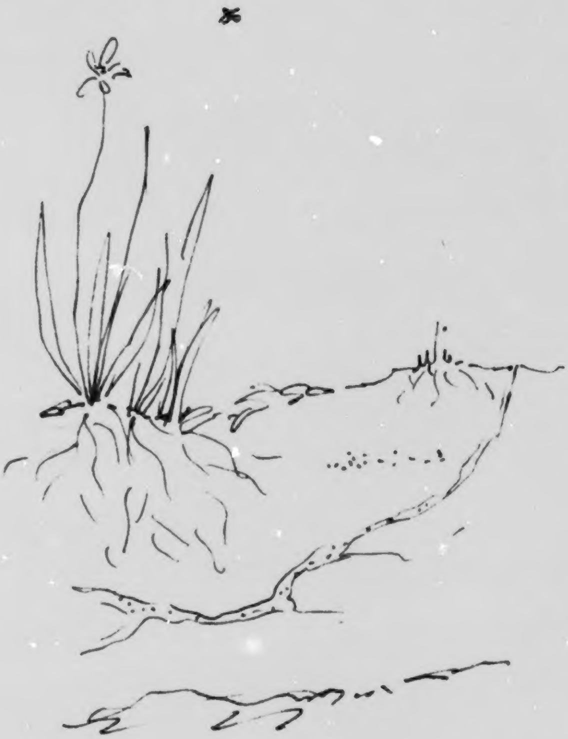
A *resource* is something that can be used to keep life going. People use different kinds of resources to meet their different needs. In this exercise, you can read about some of the resources that people use today.

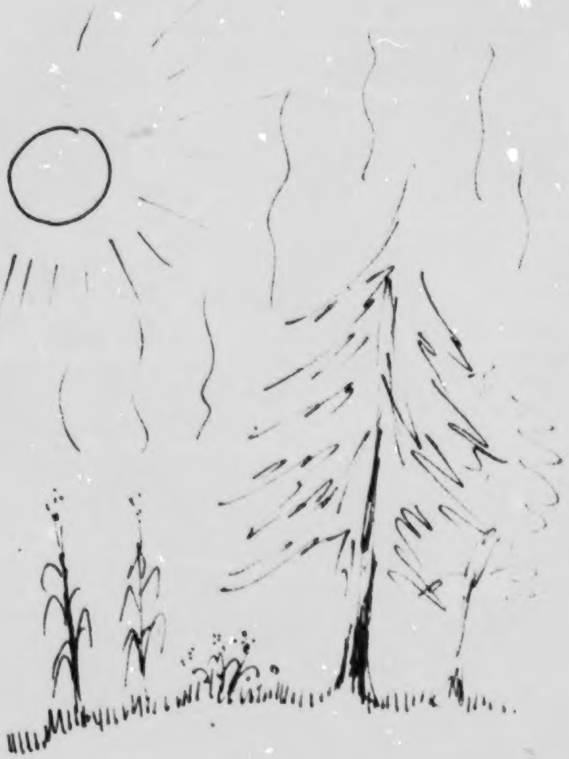
Sun, air, water, the earth, soil, plants, and animals too-- all are resources that can be used to help keep alive. Here are a few facts about each one of those seven important resources.

THE EARTH is the source of things needed by plants to grow. Men use it to get raw materials such as stone for weapons or building, clay for dishes, and ores for metal. Fuels such as coal and oil are also found under the earth. The things which are taken out of it cannot be replaced.



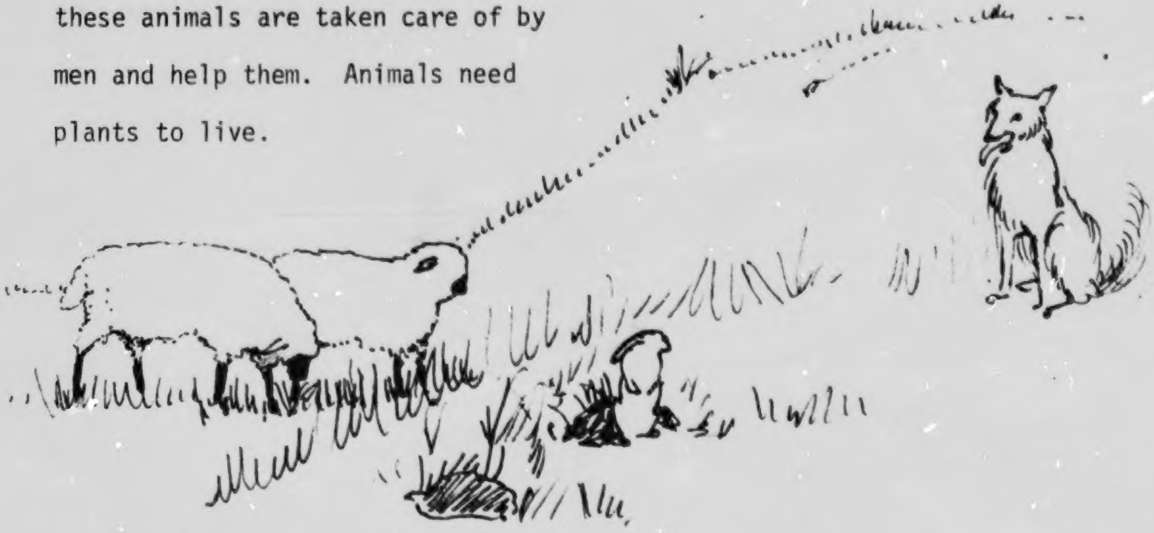
THE SOIL is the thin layer on top of the earth. It includes minerals from the earth, dead plant materials, and insects and other creatures which change all these things into something which plants can use. It takes a long time to make soil, and it is easily destroyed by erosion (being washed away after plants that held it down are gone). Soil can also be destroyed when people dig into it looking for coal or metal ore, or when one kind of plant grows on it year after year until the food in it is used up.



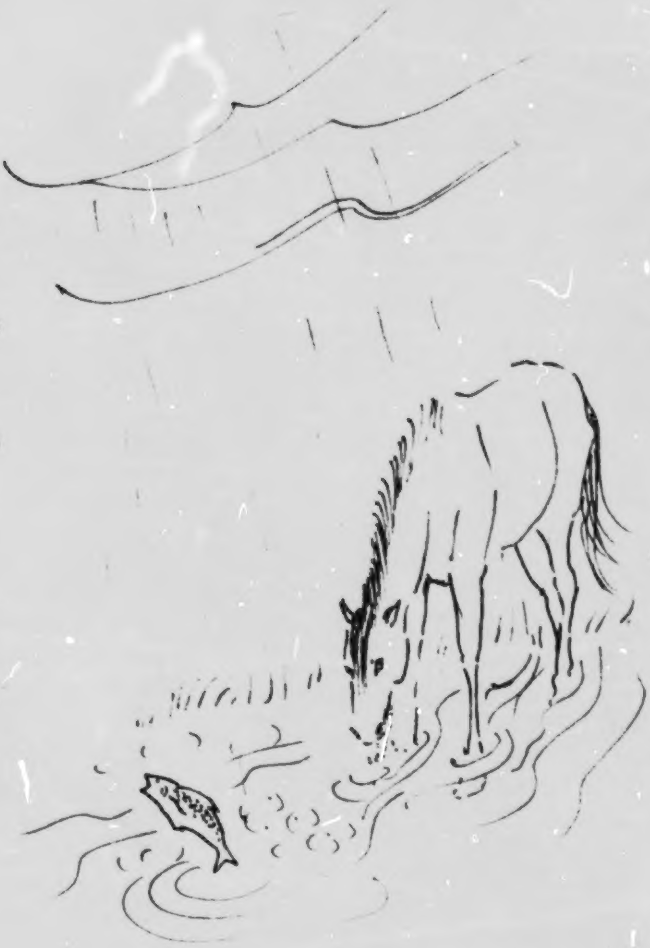


PLANTS include everything from tiny mosses to towering trees. They include grasses, food plants grown by people, wild plants which also give us food and forests which give us wood. Green plants give off oxygen, make the air fresh, and capture the energy of the sun so that when you burn them they give it back as heat. To live they need good soil, air, and water.

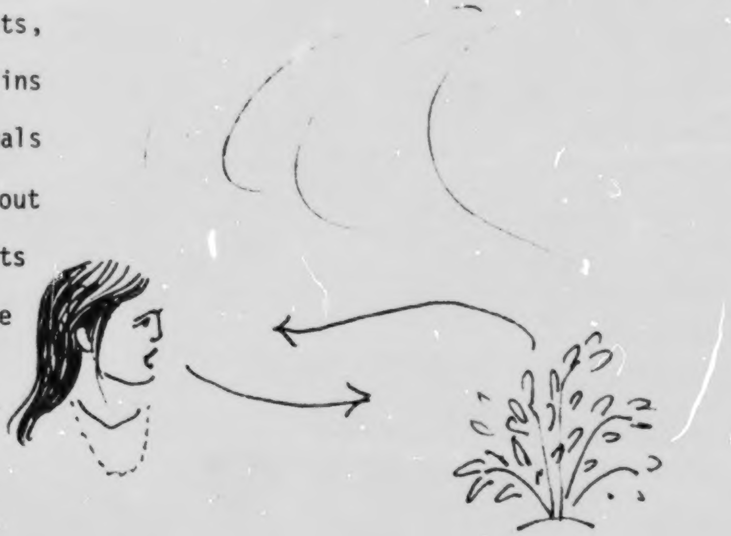
ANIMALS include insects, birds, animals that eat plants, and animals that eat other animals. Some of these animals are taken care of by men and help them. Animals need plants to live.



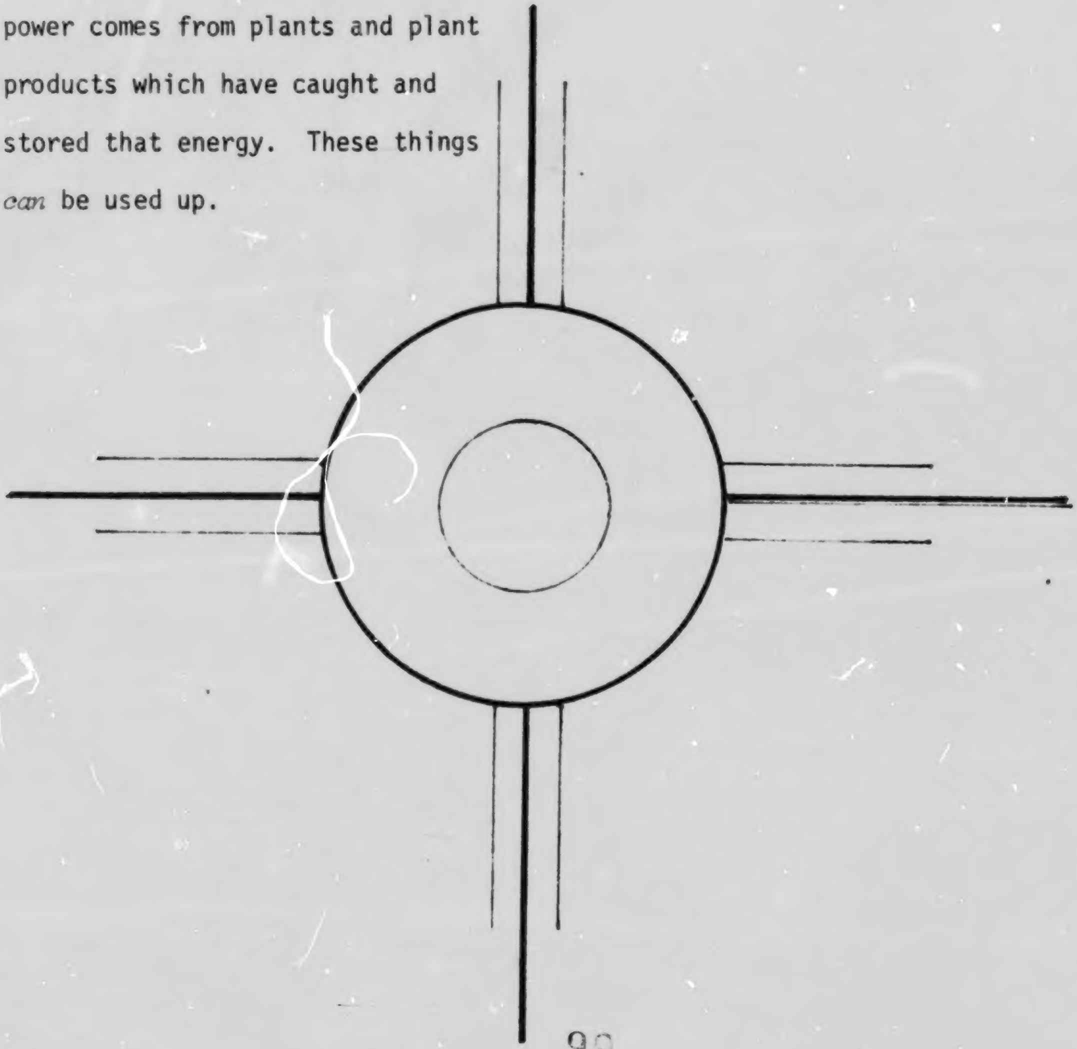
WATER moves through a cycle. It starts with cloud vapor, rain, rivers, lakes or seas, above or below the earth, then goes into plants or animals and then returns into the air again. It is necessary for plants or animals to live, and if it is all used up in one area, people in another area may not have enough. It is also very easy to poison water by dumping things in it so that nothing can use it.

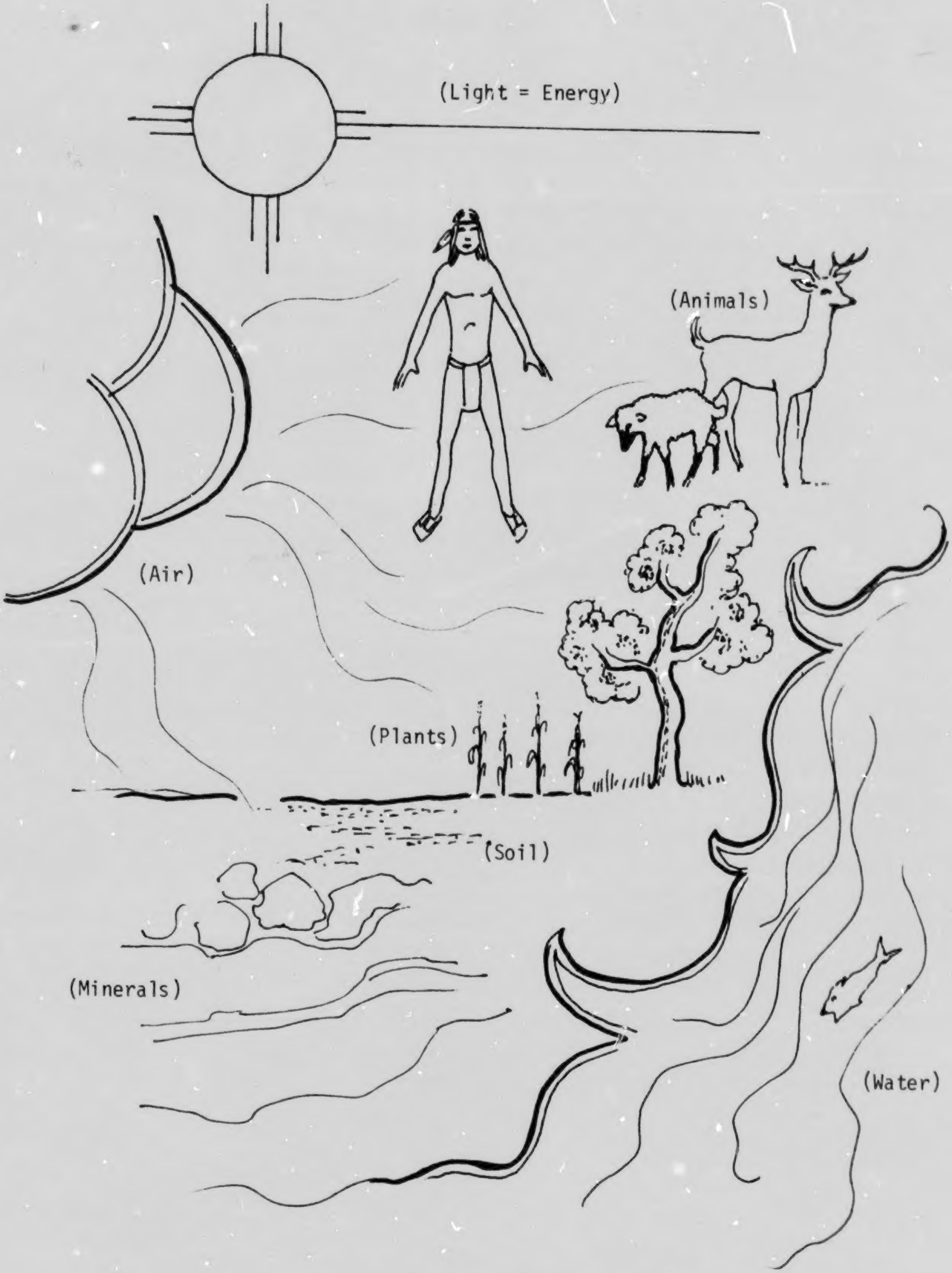


AIR is also necessary for plants, and animals to live. It contains several different gases. Animals breathe in oxygen and breathe out carbon dioxide, and green plants take in carbon dioxide and give off oxygen.



THE SUN is the only resource which is not being used up. Sunlight is the basic source of energy--the power to run machines, keep us warm, etc. Scientists are trying to learn how to use the sun's energy directly, but right now most power comes from plants and plant products which have caught and stored that energy. These things *can* be used up.




(Light = Energy)
(Animals)
(Air)
(Plants)
(Soil)
(Minerals)
(Water)

EXERCISE 2. RESOURCES AT WORK

A. The Mandan Home

Thing in the home	What was it made of?	Is that a natural or man-made material?
1. earthlodge	dirt and wooden poles	natural

B. The Modern Living Room

Thing in the room	What was it made of?	Is that a natural or man-made material?
1. living room	boards, insulation, plaster	both

SAMPLE ANSWERS

EXERCISE 2

A. THE MANDAN HOME

1. the earthlodge--*dirt and poles, earth, plants (natural)*
2. fire--*wood, plants, fire (natural)*
3. corn--*plant life (natural)*
4. moccassins--*animal leather (natural)*
5. ceremonial shirt--*animal leather, porcupine quills (natural)*
6. backrest--*reeds, sticks, plants (natural)*
7. travois--*poles, leather, plants, animals (natural)*
8. buffalo skull--*animal (natural)*
9. smokehole--*smoke (manmade), light/sun (natural)*
10. bowl--*wood,plant (natural)*
11. pouch--*animal leather (natural)*
12. buffalo robe--*animal leather (natural)*
13. dog--*animal (natural)*
14. lance--*wood, stone, leather thongs, plant, earth, animal (natural)*
15. shield--*wood frame, leather cover, paint, plant, animal, earth (natural)*
16. doll-*corncob and silk, sticks and leather, plant, animal (natural)*
17. waterbottle--*clay, earth (natural)*
18. flute--*reed, plant (natural)*
19. basket--*sticks and grasses, plant (natural)*
20. pipe--*stone, wood, earth, plant (natural)*

B. THINGS IN THE LIVING ROOM

1. living room- *wood, insulation, plaster (natural) and manmade*
2. gas furnace--*steel, gas manmade from earth and fossil, plants*
3. potatoes--*plant (natural)*
4. shoes--*leather, imitation rubber (natural and manmade)*
5. coat--*wool (natural)*
6. chair--*wood, cotton and synthetic fiber, foam rubber (natural and manmade)*
7. car--*steel, rubber, plastic (manmade)*
8. steak--*animal (natural)*
9. window--*glass (manmade), sunlight (natural)*
10. plate--*clay (natural)*
11. napkin--*paper (manmade)*
12. laprobe--*wool (natural)*
13. dog--*animal (natural)*
14. lamp--*metal, glass, paper shade (manmade)*
15. television--*wood, metal, glass (natural and manmade)*
16. doll--*plastic (manmade)*
17. coca cola can--*aluminum alloy (manmade)*
18. pictures--*paper and chemicals (manmade)*
19. briefcase--*leather (natural)*
20. cross--*wood (natural)*

Exercise 3. Using Resources, or Using Them Up?

When students have finished correcting their answers to exercise 2, ask them, "What materials were used in making things in the modern living room that were not used in the Mandan home?"

Answers might include: plaster, steel, gas, imitation rubber, synthetic fiber, foam rubber, plastic, glass, paper aluminum alloy, chemicals, etc. It will become clear that people living in a contemporary, industrialized setting use many materials that were not available to people in a traditional setting, and that most of these materials are man-made.

Tell the class that now that they know something about how materials are used, they will find out something about the environment that produces them.

This information is included in the reading on pp. 75-81 . Because this is rather long, you may prefer to give students this information in the form of a lecture instead of reproducing the reading and giving it to them. The important points to stress are written in italics.

When you have finished, students should understand the meaning of the following terms: balance of nature, conservation, re-cycling, energy, power, and fuel. One way of getting them to review and demonstrate this understanding would be to have them draw or cut out pictures illustrating each term.

EXERCISE 3. USING RESOURCES, OR USING THEM UP?

THE BALANCE OF NATURE

A balance of nature exists in an area when each creature living there has enough to eat, but none take so much that animals and plants living there cannot replace themselves. Each area has enough resources for a certain number of plants and animals to live. If there are more than that number in an area, the weaker ones will not be able to get enough and will die off until the number is correct once more. Sometimes, however, too many die, and that kind of animal disappears.

Indian people have always known about this need for balance in nature. Herbert Blatchford, a Navajo who is director of the Gallup Indian Community Center and a founder of the National Indian Youth Council, says this:

> "The Indian has tried and is still trying to live in harmony with the universe, and, in the past, in times of natural abundance, the Indians did slay animals only to satisfy their needs of ritual, food, shelter, and clothing. Since confinement to specific land areas, the natural turnover of supply and demand has become a thing of the past, but thoughts of pursuing harmony are still in the minds of the people...when the land is sick, the people are sick, and when the people are sick, the land is sick..."

Small groups of people spread over the land--using only what they needed and wasting nothing--were able to live happily without changing the balance of nature. But they had little security. If the winter was too cold or long, if the rains didn't come, if the buffalo went to another place that year, many people starved.

People who live in cities do not usually have to starve if things are bad where they live. For example, if they have machines to move people and goods a long ways in a short time, they can store up food, or can bring it from parts of the world where there is plenty. For a long time, non-Indians have thought that with fast cars, trains, etc., and with better machines to farm or to get materials from the earth, they would have no problems meeting their needs.

But just as one area can become unbalanced if too many of its resources are taken before they can be replaced, the whole world can suffer if people are using all of it. And there are some things that can't be replaced.

Conservation is the word for keeping a close watch on resources and making sure we don't use too much at once. It also means trying to put back what we take away. For example, although a lumber company cuts down many trees in a forest, the forest itself can be *conserved* if the company plants more trees to replace those that are gone. If land is farmed too much, people can add fertilizer and compost made of all the leftover parts of the plants. By doing this, they will be putting the minerals and living organisms back into the soil.

Minerals that are mined out of the earth cannot be replaced, but some of them can be used again. This is called *re-cycling.* Newspapers, magazines, and other kinds of paper that have been used can be *recycled* into new paper so that more trees will not have to be cut down. Even some plastics can be used again. But there is no way of replacing oil, gas, or coal once they have been burned.

One of the most important resources to be conserved is the soil itself. In most places, the topsoil is only a few inches deep. In some areas, like the high plains, it is much less than that. However, it is in the topsoil that one finds the most important things that plants need to grow. But soil is loose and light. If it is not held down by growing plants, it is easily washed away by water (erosion) or blown away by the wind.

When the topsoil is thin, it takes very little to ruin it. A motorcycle crossing the desert can crush the few plants and leave a scar that slowly spreads for many feet on either side. When there is not enough food for the animals in an area, they may eat every green thing they can find. If they eat all the plants, the soil will be destroyed. If the soil is destroyed, new plants cannot grow.

We now know enough about the resources of the whole world to realize how few there are, and how fast they are being used. This speech from a Pawnee ceremony is as true for us now as it was for the Pawnee many years ago:

> "Conserve what you have. Do everything in a measured way. Heaven wanted us to live on this earth and here we are. These are the things that Heaven gave us--the corn and other things--and we must take care of them. We can't

throw away or waste anything. We can't know what is going to happen in the future. Raru (merely, just), kakirarakurararat (don't waste anything)!

ENERGY

Energy is the force that helps a living thing meet its needs. Energy usually depends upon movement of some kind. The simplest kind of energy is produced when a living thing eats food.

You are using energy of this kind when you find a tree with ripe fruit and pick the fruit to eat. You are also using this kind of energy when you ride a horse to look for food or plow a field or carry food from one place to another.

People have done a lot using only their own energy, or muscle power. But they are also always looking for ways to make things easier. One of the first other sources of energy people discovered was *fire*.

People get energy by eating plants or by eating an animal which has eaten plants. In the same way, fire must consume plants to produce energy. This energy can be used to cook food, harden things, melt things, or keep us warm. It can be used for many other purposes too. We might call this *fire power*.

For thousands of years, people got along quite well with energy from their own bodies, from animals, and from fire.

People, animals, and fire are not the only sources of energy, however. There are other ways of getting things to move. *People often call man-made ways of moving things different kinds of power.* One of them is *water power,* which is produced by putting a wheel with paddles in it into a fast river so that the water will push the wheel around. A moving wheel like this fixed to another wheel will grind corn or do other kinds of work. *Wind power* can also be used to push boats, or in a windmill, to draw up water out the the ground.

The first engines that were made were moved by *steam* power. Wood or coal was burned to heat water so that it produced steam which made the engine go.

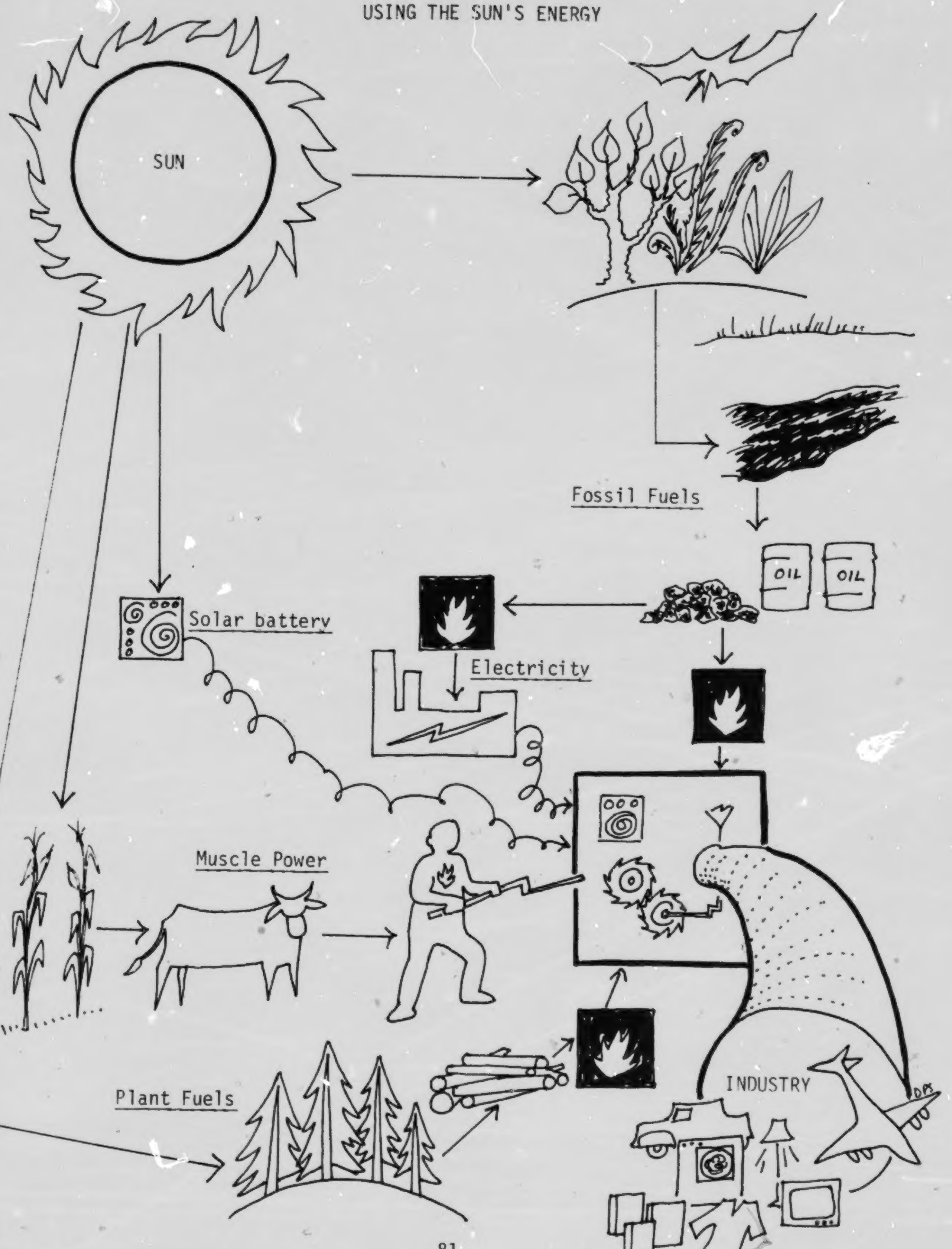
In the nineteenth century, people discovered how to produce *electrical power.* We have learned how to use this power so well that now whole cities depend on it. Most of the "labor-saving" machines that have been invented in the past few years are run by electricity. There are machines to dry your hair, brush your teeth, clean your floor, and wash the clothes. Stoves, refrigerators, television, lights, all run on electricity. So do many machines used in factories.

Some furnaces also run on electricity. But most of them, burn gas or oil. Gas and oil can also be used for large machines which use heat, such as stoves and clothes dryers. The giant furnaces that make steel burn coal.

Fuels are materials that can be used to provide power, usually by burning or chemical action. Plants can be used as fuel by burning them. But wood does not make a very hot fuel. The *fossil fuels* are better. The fossil fuels are coal, natural gas, and petroleum (oil, gasoline) which were formed by weight and chemical action on plants millions of years ago. These fuels can be burned in motors, especially in machines which move about, such as cars and airplanes. They can also be used to run generators which make electricity. Fossil fuels cannot be replaced once they are gone.

A lot of research is now being done on *atomic power*. Scientists are also trying to develop ways of using the power of the sun directly, without having to turn it into a plant, or a fossil fuel first.

USING THE SUN'S ENERGY


SUN
Fossil Fuels
OIL
OIL
Solar battery
Electricity
Muscle Power
Plant Fuels
INDUSTRY

Exercise 4. Review Questions

When you feel that students are comfortable with the material in the reading, give them the review questions on p. 83.

When they have finished, use the sample answers on p. 84 to help them correct their work. Discuss the answers with students, referring back to the reading or other source of information. Questions 4 and 5 may require additional examples of things produced by different kinds of power before students have assimilated the idea. The point to be made here is that while everything in the traditional home was made by muscle-power or the burning of simple fuels, almost everything in the modern home was made by power produced by various mechanical means, involving the use of electrical power or fossil fuels.

Ask students which of these kinds of energy can be replaced most easily. It should become clear that whatever its other advantages may be, a modern home uses up both materials and energy. However, you should point out that a non-technological society can be destructive too, though it usually takes longer. Parts of the world like the Mediterranean and the Sahara have changed from forest to near-desert or desert within historic times because people have cut down all the trees for firewood and allowed their animals to eat up all the vegetation.

In the 1940's the soil on the Navajo reservation was beginning to wash away because sheep ate all the plants and the tribe was forced by the government to get rid of many of its animals. A book called "When Navajos Had Too Many Sheep," by George A. Boyce tells about this crisis and its effects. It is available from The Indian Historian, 1451 Masonic Avenue, San Francisco, California 94117 for $5.00 (+ 6% sales tax for Californians). If you can obtain this book, and have the time, students might benefit from a discussion of different ways of dealing with an ecological problem on an Indian reservation.

Additional Activities

Audio-visual materials appropriate for use with this Activity are listed on p. 143.

Have student find out where electrical power used in their community comes from. How do local gas stations get their gasoline?

If it can be arranged, a field trip to an electrical power plant, coal-gasification plant, or other energy-producing establishment would be a valuable experience for students. Some power companies will also provide free literature on their operations on request, or send a representative to visit the class and talk about what the company does and how it does it.

EXERCISE 4. REVIEW QUESTIONS

1. Check the incidents described below which you think would probably upset the balance of nature:

   _____a. A mountain lion kills a deer and eats part of it. A coyote eats some of what's left, and crows, and ants and other insects take care of the rest. The bones become part of the soil.

   _____b. A disease kills all the mountain lions in an area. Nothing eats the deer, and the deer eat up all the plants.

   _____c. Fertilizer is washed into a lake. It makes the water plants grow so well they cover the lake so that no air gets into the water.

2. Check the things listed below which you think can be re-cycled:

   _____a. beer bottles

   _____b. gasoline

   _____c. left-over food

   _____d. newspapers

3. What kind of power are you using when you:

   a. carry a bag of groceries home from the store? ________________________

   b. turn on a light? ________________________________

   c. drive your car to a football game? ___________________________________

   d. sail a boat? ____________________

   e. use a sewing machine? ___________________________

4. What kinds of energy were probably used to make the things in the Mandan home?

5. What kinds of energy were probably used to make the things in the modern living room?

SAMPLE ANSWERS

EXERCISE 4. REVIEW QUESTIONS

1. Check the incidents described below which you think would probably upset the balance of nature:

    ____ a. A mountain lion kills a deer and eats part of it. A coyote eats some of what's left, and crows, and ants and other insects take care of the rest. The bones become part of the soil.

    ✓ b. A disease kills all the mountain lions in an area. Nothing eats the deer, and the deer eat up all the plants.

    ✓ c. Fertilizer is washed into a lake. It makes the water plants grow so well they cover the lake so that no air gets into the water.

2. Check the things listed below which you think can be re-cycled:

    ✓ a. beer bottles

    ____ b. gasoline

    ✓ c. left-over food

    ✓ d. newspapers

3. What kind of power are you using when you:

    a. carry a bag of groceries home from the store? *muscle power/people power*

    b. turn on a light? *electricity/electric power*

    c. drive your car to a football game? *gasoline/fossil fuels*

    d. sail a boat? *wind power*

    e. use a sewing machine? *electric power*

4. What kinds of energy were probably used to make the things in the Mandan home?

    muscle power, fire (plant fuels), the sun

5. What kinds of energy were probably used to make the things in the modern living room?

    electricity, fossil fuels, some muscle power.

Activity 4. Where Does It All Go?

GOAL: To help students understand the problem of pollution

OBJECTIVE: Students will give examples of waste disposal methods used in a traditional Indian home and those used in a modern home today.

WHAT STUDENTS WILL BE ASKED TO DO

- Read a discussion of what "waste" is
- Describe how things in the Mandan and the city home were disposed of
- Read about pollution
- Answer review questions about readings

MATERIALS NEEDED

- paper and pencil

PROCEDURE

Whether resources are used to support a biological or a social organism, something is always left over. At present the question of how to deal with these by-products is almost as serious a problem as how to conserve dwindling resources. In one sense it is a new problem--until recent years not only did there seem to be plenty of room to dispose of wastes, but almost all of the left-overs decomposed naturally into useable material anyway.

Exercise 1. Waste

Explain to students that they have learned something about what people need and how they use resources to get it. But have they ever thought about what happens to the things that people don't need? Take an example such as a lunch from the school cafeteria or a nearby cafe, and ask students "When you have finished with this, is there anything left over?" Students should be able to observe that leftovers will probably include some pieces of food, aluminum cans or milk cartons, napkins, etc., depending on the menu.

Point out that eating is only one of the human activities that produces left-overs. In this Activity, they will be finding out something about where the left-overs ("waste") goes, and how it affects our environment.

Read aloud, or reproduce and give to students to read the material on pp. 87-88. This reading defines different kinds of waste, and describes how some kinds of waste can be re-cycled.

When students have finished with the reading, discuss it briefly, offering other examples of waste-disposal and re-cycling with which students might be familiar. Be sure that students understand the difference between garbage, trash, and sewage.

EXERCISE 1. WASTE

In nature, there is no waste. Everything is used. For example, when wood is burned, three things are produced--fire, smoke, and ashes. After the fire, the smoke and ashes are left. The smoke blows away, but the ashes become part of the soil. From this soil grow green plants. Then a cow comes along and eats the green plants. Part of what the cow has eaten is used for energy. Part of it is eliminated. Cow droppings are fertilizer. This fertilizer helps make new soil which will help make new plants which will help feed another cow. This is one of nature's many cycles.

People are the only ones who do not always follow the cycles of nature. We make things which have parts that cannot be used at all. These parts are what we call *waste*.

In the world of people, there are three kinds of waste. The first kind is *garbage*. Garbage is all the parts of food that we do not eat--for example, corn husks, orange peels, and food that is left over at meals. The second kind of waste is *trash*. Trash is all of the other things that we throw away--for example, empty tin cans, cardboard boxes, rags, and furniture. Trash and garbage are often put together and dumped in the same place. This is foolish, however, because if they are kept separate, trash and garbage can be used in different ways. The third kind of waste is human waste or animal waste. This is usually put into sewers, or into a river or the ocean or into a cesspool underground. It is often referred to as sewage.

Garbage and human waste or animal waste can be buried in the earth. In this way, they can be used to make the soil rich. Some kinds of trash--like tin or metal--can be melted down and made into new Coke bottles, beer cans, machine parts, and other things. Other kinds--like paper and cloth--can be pulped and made into new paper. In many communities, re-cycling centers collect trash that can be used again. Some companies even pay for returned bottles and cans.

What one person thinks is a totally worn-out pieces of furniture or clothing, another person may think is something that only needs a little work to be useful again.

The Salvation Army and other organizations collect junk so that it can be fixed up and used again. Parts of old cars can be used to repair others. And, if something is hopeless, with a little work it can be taken apart and its different parts melted, pulped, or whatever needs to be done.

There are very few things that cannot be made useful if some one is willing to make an effort.

Exercise 2. Disposing

For this exercise, students will need the pictures and lists of items in the Mandan and modern homes again. Have students get them out, or hand them out again.

Introduce the exercise by reminding students that in the last Activity they figured out what all the things in the Mandan home and the modern home were made out of. What do they think would happen to each of these things after it had been eaten, worn out, or used up?

In this exercise, students will be asked to list each thing in each home again, and tell what will happen to it when it can't be used anymore. They should be sure and note whether the thing, or parts of it, can be re-used or turned into something else.

A worksheet format for this exercise is included on pp. 90-91.

To do this exercise, students may draw on information in the reading (exercise 1) and on their own observations. This should be sufficient for them to figure out what will become of everything in the Mandan home, and most of the things in the modern one. Sample answers are provided on pp. 92-93. Find out which items students were able to describe ways of disposing, and use the sample answers to guide class discussion until students agree on the answers. At the end of the discussion, ask, "What is the main difference between what happens to the things in the Mandan home and in the modern home? Why does this difference exist?"

Students should be able to deduce that whereas everything in the Mandan home is bio-degradable--that is, it all can eventually return to the soil, many things in the modern home will stay in the same form for an indefinite period. This is because they are made of synthetic materials.

However, they may want to do some research rather than guessing at the answers or having them supplied. When students have done as much of the exercise as they can, discuss the exercise, and see if they agree on which items they need more information about. Write suggestions on the board until you have a list of items which students do not know how to dispose of.

Suggest to students that they divide this list up into categories--machinery, building materials, etc. and give each workgroup one category to research. Reports could be presented to the class later. Give workgroups suggestions on how to find out the information, such as talking to adults, looking in the phone book for junk yards to call, contacting the local health department, sanitation department, or police department for information, etc.

EXERCISE 2. DISPOSING

A. The Mandan Home

Thing in the home	What happens to it	Can it be re-used? How?
1. earthlodge	earth becomes soil again, poles can be burned or decay	poles can be re-used in new house, or used for other wooden objects

B. The Modern Home

Thing in the home	What happens to it	Can it be re-used? How?
1. living room	wood--burn or decay plaster } { carry to junkyard or use for fill/do not decay insulation }	use wood in other houses

Sample Answers

EXERCISE 2. DISPOSING

A. The Mandan Home

Thing in the home	What happens to it	Can it be re-used? How?
1. earthlodge	earth becomes soil again, poles can be burned or decay	poles can be re-used in new house, or used for other wooden objects
2. fire	*smoke goes into air, ashes become part of soil.*	*no*
3. corn	*husks can decay into soil*	*corn husks can be used to feed animals, made into dolls, masks, etc.*
4. mocassins 5. shirt	*leather becomes soil*	*pieces can be re-used*
6. reed backrest	*wood becomes soil*	*can be burned*
7. travois	*wood, leather become soil.*	*pieces can be burned or used to make other things*
8. buffalo skull	*will decompose in soil*	*bone can be used for tools. the skull was also sometimes used as a religious object.*
9. smokehole	*smoke goes into air*	*no*
10. bowl	*burn or become soil*	*no*
11. pouch 12. buffalo robe	*leather can become soil*	*pieces can be re=used*
13. dog	*body will become soil*	*hide could be used*
14. lance	*wood becomes soil*	*can be burned*
15. shield	*wood, leather become soil*	*wood can be burned, leather re-used*
16. doll	*becomes soil*	*pieces can be re-used*
17. waterbottle	*pieces can add minerals to soil*	*pieces can be ground up and used to temper clay for new pots*
18. flute 19. basket	*become soil*	*can be burned*
20. pipe	*stem becomes soil*	*bowl can be used indefinitely*

B. The Modern Home

Thing in the home	What happens to it	Can it be re-used? How?
1. living room	wood--burn or decay plaster, insulation } carry to junkyard or use for fill/do not decay	use wood in other houses
2. gas furnace	*gas fumes into air* *furnace to junkyard*	*could be melted down, but probably won't be*
3. potatoes	*garbage, dump or rivers, lakes or oceans*	*can be used to fertilize family garden*
4. shoes	*leather decays, rubber doesn't*	*can be given to charity for someone else to use*
5. coat	*burned in junkyard*	*given away or cut up for cloth*
6. chair	*wood decays, rubber cushions and nails don't*	*wood could be burned*
7. car	*rust in junk yard*	*parts used in other cars* *metal melted down*
8. steak	*garbage, dumped*	*scraps given to dog*
9. window 10. plate	*dumped, does not decay*	*glass can be melted down*
11. napkin	*decay*	*burn*
12. laprobe	*burned in junkyard*	*could be cut up and re-used*
13. dog	*will decay in soil*	
14. lamp	*rust in junk yard* *paper shade might decay*	
15. television	*wood case can be burned or decay* *other parts can only be junked*	
16. doll	*to junkyard. plastic gives off poisonous fumes if burned.*	*could be given to charity*
17. coca cola can	*to junk yard or to*	*factory to be melted and re-used*
18. pictures	*decay*	*or burn*
19. briefcase	*decay*	
20. cross		*burn*

Exercise 3. Pollution

The Indian way of living with the land was to change it as little as possible. Read this comment by an old Wintu woman to the class as an example of a traditional Indian reaction to what has happened to the earth in the Industrial Age.

> "The white man never cared for land, or deer, or bear. When we Indians kill meat, we eat it all up. When we dig roots, we make little holes. When we build houses, we make little holes. We shake down acorns and pine nuts. We don't chop down the trees. We use only dead wood.
>
> But the white people blow up the ground, pull down the trees, kill everything. The tree says, "Don't. I am sore. Don't hurt me." But they chop it down and cut it up. They blast rocks and scatter them on the ground. How can the spirit of the earth like them?"

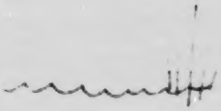
This quotation has been made into a poster which is available at 3 for $1.00 or 50¢ plus 25¢ for a mailing tube and handling from: Akwesasne Notes, Mohawk Nation, Rooseveltown, N. Y. 13683.

When you have read the lines above, comment that this was said by a California Indian woman who had seen what happened when the miners and ranchers moved in. Ask students if they can give any examples of how people in their own tribes used the land. If your students are all from the same tribe, try to find some information on this point yourself before hand.

Now, explain that students have all probably heard the word "Pollution." It is one of the big problems that American and other industrialized nations have to deal with today. In this exercise, they will learn something about the kinds of pollution people are worrying about.

Reproduce and give students, or read aloud, the material on pp. 95-98 . If possible, make a transparency of the picture on p. 98 and show it to the class. This drawing shows how pollution can affect the food chain.

WATER POLLUTION

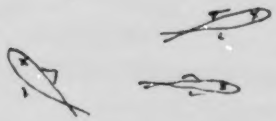


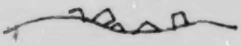
Water pollution is adding to water anything which makes it unclean or which changes the way it should work in an ecosystem.

One way people pollute water is by dumping raw or poorly treated sewage into it. Human and animal wastes may carry disease germs. They also are bad, sometimes deadly, for plants, fish, insects, and other things in the water.

People have polluted water in other ways, too. For example, we have added a lot of chemicals--some of them poisons. Some of the most frightening poisons are *pesticides* (insect-killing chemicals) and *herbicides* (plant-killing chemicals). One of the best known of these--now being outlawed in a number of states--is called DDT. We have been using DDT and other insect and weed killers for about 25 years. DDT lasts and lasts, no one knows how long. Some pesticides are bad for the environment and should not be used. Others do not pollute the environment and can be used.

Lately we have found a new way to pollute water. It's called *thermal pollution*. This happens when, heated water flows into cold water. Heated water like this kills plants and animals in our rivers, lakes, and oceans. If the plants and animals die, the ones who eat those plants and animals, like us--may die, too.





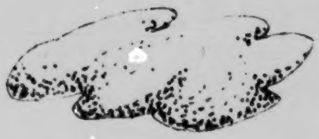
LAND POLLUTION

We have built villages that have grown into cities--usually without planning--and cities that have grown into suburbs. We have built factories to meet our growing needs and looked the other way when our air was fouled with smoke and our streams with chemical poisons and wastes.

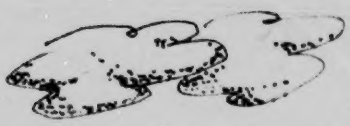
We have built roads over our land like a concrete spiderweb. We have lined them with billboards, signs, and posters. We have littered their edges with bottles, cans, and other trash. We have put gaping holes into our landscape in search of fossil fuels and minerals. We have bored holes deep into the earth's crust in search of oil. We have covered our marshes and wetlands and filled these places with rows after row of houses.

We call this progress, then we look around and are sad because the land where we live is ugly. We have ruined so many parts of our ecosystem, that our environment is sick. And there are more people every day.

What does that mean to us? It could mean the end of our environment.



AIR POLLUTION



How have we misused and polluted our air? In many ways--factories used to air pollution. Huge mills burned coal and later, oil. This poured soot and gas out into the air. The chemical industry eat poisons of all kinds get into the air. Then came cars--now there are millions of them burning gasoline and polluting the air. Some people say that cars in this country pump into the air 75 million tons of poisons per year. The more people we had, the more homes we built. All the homes burned fuel and added smoke to the air.

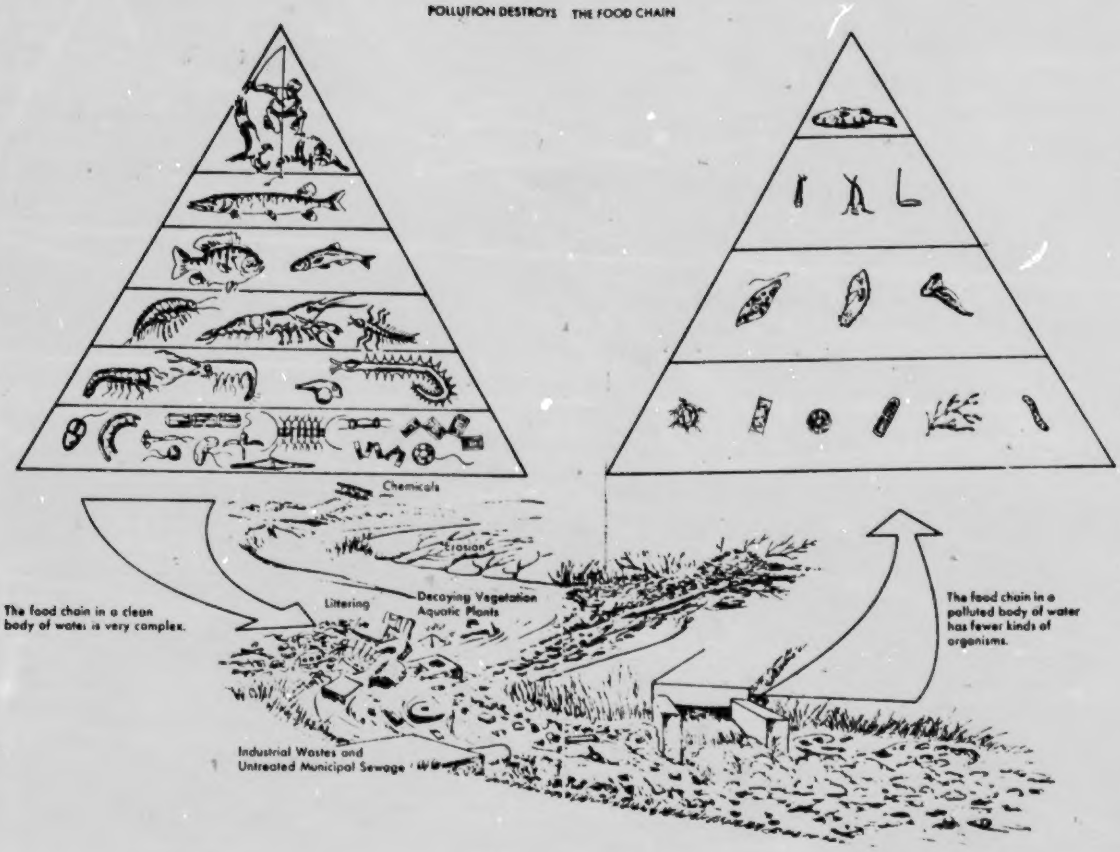
Now we have an invisible danger--radioactive wastes from nuclear plants.

What does this do to you and me? To begin with, it makes us sick. Air pollution is bad for people and plants. At street corners, where cars stand waiting with their motors running at traffic lights, the leaves of nearby trees are often yellow and drying while they are green and healthy in the middle of the block.

Fortunately, something is being done about air pollution. Factories have been told to cut down their smoke and other dangerous soots and gases. Car makers are now building antipollution systems into their engines. Local governments are stopping open burning. We can do something about air pollution--just as we can about other environmental pollution--if we work at it together.

We will probably find out about other kinds of pollution as time goes on. We should watch out, because if our environment goes, so will we!

POLLUTION DESTROYS THE FOOD CHAIN



The food chain in a clean body of water is very complex.

The food chain in a polluted body of water has fewer kinds of organisms.

Chemicals
Erosion
Littering
Decaying Vegetation
Aquatic Plants
Industrial Wastes and Untreated Municipal Sewage

Exercise 4. Review Questions

When students have finished with the reading, discuss it, going over the information presented to make sure students understand it. If possible, give examples of different kinds of pollution in the area around the school, or ask students if they have noticed such examples.

Then, reproduce and give students copies of the questions on pp. 100-101. Sample answers appear on pp. 102-103 and can be given to students or used as a basis for discussion of the questions so that students can check their answers.

Additional Activities

Audio-visual materials which might be used in conjunction with this Activity are described on p. 143.

An activity which would help students understand the information in this Activity would be to have each workgroup take one form of waste produced by the school (scrap paper, garbage, etc.) find out what happens to it, and report to the class.

If there are any waste treatment plants in the area, the class might plan a field trip to visit one, certain students might visit it and report to the rest, or personnel from the plant might be asked to come speak to the class on what they do.

Another useful Activity would be to start a class re-cycling project. Students could collect materials for salvage and re-cycling from their own and other students homes, the school, or elsewhere in the community and use the money earned to finance their field trip or for some other appropriate goal.

EXERCISE 4. REVIEW QUESTIONS

1. a. Describe one or more things that can cause water pollution:

   b. What is one thing that can happen if water has been polluted?

2. a. Describe one ore more things that can cause land pollution:

   b. What is one thing that land pollution can do?

3. a. Describe one or more things that can cause air pollution:

   b. What is one thing that air pollution can do?

4. A certain river flows through farm land down to the sea. Many little fish live at the mouth of the river where they can eat the bits of food the river brings down. Sometimes big fish come in from the ocean to eat the little fish. One day a boy caught one of these fish, but when he ate it, he got sick. The doctor said he had been poisoned by DDT, a poison used to kill insects.

   Describe or draw a picture which shows, how the DDT might have gotten to the boy.

5. Fill in the right words to finish these sentences:

a. Herbicides are poisons used to kill needs, but ____________________ are poisons used to kill insects.

b. Adding something to a thing that will poison or change, it is called __________________

c. If you bury __________________ in the earth, it will eventually be turned into new soil itself.

d. In most cities, ____ is washed into rivers or the sea, but it could be used for fertilizer.

e. The trouble with ________________ is, that lots of it cannot be re-used or turned into anything else.

f. Thermal pollution is caused when a factory, nuclear energy plant, etc., lets __________________ into the air or water nearby.

SAMPLE ANSWERS

EXERCISE 4. REVIEW QUESTIONS

Any of the following:

1. a. **Describe one or more things that can cause water pollution:**
   add pesticides, fortilizers, dirt, trash, or other things that make it dirty or poisonous

   b. **What is one thing that can happen if water has been polluted?**
   It can kill creatures that live in it or drink it, it can make plants grow so fast they cut off the seenlight and then die and cut off the oxygen in the water

2. a. **Describe one ore more things that can cause land pollution:**
   building all over the land, tearing it up, littering it, poisoning it with pesticides or herbicides, etc.

   b. **What is one thing that land pollution can do?**
   make the land ugly, destroy the soil, destroy the plants and animals who lived on it, etc.

3. a. **Describe one or more things that can cause air pollution:**
   letting smoke from engines or furnaces, or chemical fumes, get into the air, using land wrong so dust fills air.

   b. **What is one thing that air pollution can do?**
   makes air poisonous, which kills people, animals and plants, cuts off sunlight.

4. A certain river flows through farm land down to the sea. Many little fish live at the mouth of the river where they can eat the bits of food the river brings down. Sometimes big fish come in from the ocean to eat the little fish. One day a boy caught one of these fish, but when he ate it, he got sick. The doctor said he had been poisoned by DDT, a poison used to kill insects.

   Describe or draw a picture which shows, how the DDT might have gotten to the boy.

   Any descriptions or picture which indicates that the DDT was used on the crops on the farmland, washed into the river, where the little fish ate or absorbed it, who were eaten by the big fish, which was eaten by the boy.

5. Fill in the right words to finish these sentences:

   a. Herbicides are poisons used to kill needs, but *pesticides* are poisons used to kill insects.

   b. Adding something to a thing that will poison or change, it is called *pollution*.

   c. If you bury *garbage* in the earth, it will eventually be turned into new soil itself.

   d. In most cities, *sewage, or human or animal waste* is washed into rivers or the sea, but it could be used for fertilizer.

   e. The trouble with *trash* is, that lots of it cannot be re-used or turned into anything else.

   f. Thermal pollution is caused when a factory, nuclear energy plant, etc., lets *heat* into the air or water nearby.

Activity 5. Doing Something About It

GOAL: To introduce some basic facts about environmental careers

OBJECTIVE: Students will answer questions about jobs associated with environmental and natural management.

WHAT STUDENTS WILL BE ASKED TO DO

- Read about environmental management careers
- Answer questions on the reading

MATERIALS NEEDED

- pencils and paper
- reproduced pages from this Guide as indicated in exercise instructions

PROCEDURE

Before we could talk about careers in the area of environmental science and resource management, it was necessary to lay down a groundwork of knowledge and concepts to which students could relate these jobs. Now that students are familiar with some of the areas of interest, they can begin to explore the careers of those who spend their lives dealing with these problems. The classroom activities for this Activity are comparatively brief. The real thrust of this section lies in the further exploration by individuals or groups of the various careers and career areas identified in the reading, and in the application of this knowledge in Activity 6.

Exercise 1. Making A Living With The Land

At this point, students have learned something about the environment and the things which threaten it. Tell them that in this exercise, they will be introduced to some of the careers which are concerned with protecting the environment and those who live in it.

In order for students to understand the career information, they should first become familiar with some of the terms often used in job titles. On the board write: professional, technician, aide, operator, engineer, employee, personnel, supervisor, and staff member.

Ask students to copy down these terms, and add their definitions as you explain what they mean. Base your explanation on the following definitions:

> A *professional* is someone who has had advanced training (college graduate or beyond) in his field. Professionals are usually in middle- or top-level positions and may direct the work of others. Someone who does this is called a *supervisor*.
>
> *Technicians* generally have some college or other training after high school, although they may not have graduated from college. They are very skilled in their own areas and do many very interesting jobs.
>
> *Aides* are people who assist other workers. They usually must have a high school education and may receive more training on the job.
>
> An *operator* is someone who runs a machine or machinery.
>
> An *engineer* is a professional who plans, designs, builds, or runs machinery to build roads, bridges, buildings, waterways, etc.
>
> Anyone who is paid for his work is an *employee* of the person who pays him. Employees may also be called *personnel*, or *staff members*.

When you are sure that students understand these terms, reproduce and give to students the reading on pp. 106-117.

When students have finished the reading, discuss it with them before going on to the review exercise.

One area which should be discussed is the different kinds of preparation needed for various careers in this area. One point you can make is that anyone interested in this kind of career should probably emphasize classes like science and math in school. One can get an entry level job in many areas with just a high school education--job titles which include the words "aide" or "operator" are often of this type. However, a Jr. College degree would be useful, and for professional jobs, a bachelor's degree or graduate work will be necessary. In some jobs, special training is also needed.

Another question to discuss is what values and personality characteristics one would need or should have to do well in different jobs. For instance, what would a forester, who spends a lot of time alone in the woods, have in common with a health inspector? How would they probably be different?

EXERCISE 1. MAKING A LIVING WITH THE LAND

Although everyone should learn about our environment and how to save it, some people have special jobs doing this. As environmental problems grow, we need more and more people who are trained to deal with them.

There are four kinds of environmental careers: 1) people who take care of the environment; 2) people who make sure that the environment is being used in the right way; 3) people who try to figure out new ways to save our environment; and 4) people who *use* the ways of saving our environment.

Here are a few examples of each kind of environmental career.

1. ENVIRONMENTAL CAREERS:

PEOPLE WHO TAKE CARE OF RESOURCES

It is important that we take care of our resources. For this reason, many different people have many different jobs working with resources like forests, fish, wildlife, soil, and water. Here are a few examples of the different jobs that people do.

Forestry

A *forester* is one who takes care of a forest. This usually means planting trees or putting out fires. But there are many other kinds of jobs that a forester may do. For example, some foresters decide which trees should be cut down and figure out how much wood these trees will produce. Other foresters help get the forests ready for camping and other vacation activities. Some foresters help test new uses for wood.

How do you become a forester? you work hard in high school, especially on math and science, so you can go to college.

Your school counselor can help you find a good college for forestry. Or you can write to the Society of American Foresters and to ask for their list of forestry schools in the United States. The society's address is:

Society of American Foresters
1010 16th Street, NW
Washington, D. C. 20036

Other jobs:
- Forestry technician
- Information or Education technician
- Surveyor's Assistant
- Biological aid
- Tree Nursery management assistant
- Forest fire control technician
- Timber stand improvement foreman

Fish and Wildlife

Game Biologist.-- As a game biologist, you might work for the state conservation department. You might look for the answers to questions like these: How many deer live in our state? Is there enough natural food to feed all those deer? How can we make sure that these deer stay well and alive? What can we do if there are not enough deer? What can we do if there are too many deer? Your answers would help the game department take care of the deer.

Game or Wildlife Manager. -- The game manager takes the reports from the game biologist and uses that information to take care of the deer. He or she might decide how much hunting should be done to make sure that there are not too many deer (or too few deer) in the state. He or she helps *preserve* places where animals can live safely in their own environment--makes sure they have water. One of the most important responsibilities of the wildlife manager is to keep a regular record of all animals in the preserve.

Fisheries Biologists and Fisheries Managers do the same kinds of things for fish.

Fish and Game Warden. -- The fish and game warden's job is to make sure that people keep the laws that protect the fish and animals in his area. When someone breaks one of these laws, the warden arrests him. By explaining the laws and by teaching sportsmen how to use their equipment the right way, the warden tries to help both man and nature. Safety rules are also very important to his job. He tries to be sure hunters and fishermen know all about them. The warden also collects information about the fish and animals in his area.

Other jobs:

- Wildlife technician
- Wildlife aid
- Animal aid
- Fish hatchery assistant manager
- Manager
- Fisheries management specialist
- Marine life technician
- Aquarist
- Marine biological technician
- Agriculture technician
- Marine quality control technician
- Sea duty technician

Many of the career opportunities in the environmental sciences have to do with soil and water. The Federal Soil and Water Conservation Service of the U.S. Department of Agriculture is one of the biggest conservation agencies in the Nation. It employs more than 15,000 career specialists in this field of work. These specialists include:

Soil Scientist. -- The soil scientist studies the soil on a farm or ranch. He tells what kind of soil is there, how much erosion has gone on, how much the land slopes, and what kind of plants are growing. He also takes soil samples to study in the soils laboratory. From this study, he can tell what is in the soil and what the soil needs to produce better plants.

Biologist. -- The biologist will check the environment of the area to find out what fish and wildlife live there and to recommend ways to improve the environment for them.

Range Manager. -- Another conservation worker is the range manager. His job is to watch over the land on which cattle and sheep are raised. His activities may include giving ranchers advice on which parts of the *range* (open country with grass and other plants which stock can eat) they should use at different times of the year, what kinds of grass to plant to improve the feed, and how to plant it, and how to protect the range against fires and insects.

Watershed Manager. -- When rain falls, the water which does not sink into the ground runs downhill, joins other little streams, and finally finds its way into large rivers which go towards the sea. An area in which all the streams feed water into the same river is called a *watershed*, and the *watershed manager's* job is to take care of this area and the water it produces.

He has to make sure that the people who live in the area are not using more than their share of the water, advise on what dams, etc. should be built to prevent floods, and make sure that electric power plants that use water, and water purification plants, are running properly. He inspects and patrols his area to make sure trespassers are not polluting the water and that animals are not eating all the plants so that the ground erodes.

Food Technician. -- This job touches many steps in the food industry. A food technician may help find new sources of food, or better ways of growing it, better ways of using foods now available, and better ways of putting it into packages and getting it to the user. Food technicians also inspect food for taste, food value, and looks.

Nuclear Technician. -- These workers assist the professionals who deal with atomic energy. They may help do research on new ways to use atomic energy, or figure out safe ways to get rid of atomic waste products, build machines used in an atomic energy plant, or check plants and the surrounding environment for radiation (invisible but harmful rays given off by atomic matter).

Other careers: Agronomist
Resource Conservation Technician
Physical Science Technician

2. ENVIRONMENTAL CAREERS:

PEOPLE WHO MAKE SURE THAT RESOURCES ARE BEING USED IN THE RIGHT WAY

Another group of conservation workers includes *monitors* and *inspectors*. These are the people who see to it that all the things we do to the environment are being done right. To do this work, one must be able to pay careful attention to details. As time goes on, there are more and more jobs both in government and industry where people check to make sure that environmental laws are being kept, who test things to make sure they are safe, and who keep an eye on things in general.

Environmental Inspectors. -- An environmental inspector watches over one of the resources in our environment (such as air, water, etc.) and makes tests to find out whether it has been polluted. He checks to see if pesticides, wastes from industry, trash, noise, heat, etc. are causing problems nearby. If there is more pollution than the laws allows, he can ask the people who are causing it to change what they are doing, or he can ask the government to make them.

Food and Drug Inspectors. -- These inspectors check businesses that make, handle, store and sell the products we buy to make sure that they meet the standards set by law. They do this by inspecting the people who work with the products, the building in which they are kept, and the things themselves, and can recommend legal action if the law has been broken. They must know what all the products they inspect *should* be like, and what kinds of problems, such as dirt, germs, etc. might be there. They often use complicated equipment to find out these things.

Health Inspectors. -- Health inspectors check places that sell food to see if they are clean, safe, and the food is healthy. He reports places that are breaking health laws and works with public health nurses and engineers to prevent disease.

Nuclear Inspectors. -- The nuclear inspector checks on the buildings, employees, and environment around nuclear plants to make sure that there is not too much harmful radiation, and that there is not too much dangerous waste. These inspectors use very complicated machines to find this out, and they also warn people if they find that the radiation level is not safe.

Testers and Analysts. -- These people are involved in checking out how well things work or what is in them. They usually work for the government.

For example, the *mechanical tester* may have the job of checking car engines to see if they are too noisy or make too much smoke. When an automobile mechanic does this to give a smog certificate, he is acting as a mechanical tester. Other mechanical testers might inspect machines in factories, airplanes, or other equipment.

3. ENVIRONMENTAL CAREERS:

PEOPLE WHO TRY TO FIGURE OUT NEW WAYS OF SAVING OUR ENVIRONMENT

Biologists. -- Biologists study plants, animals, human beings and sea creatures. They try to understand the relationship between living things and their environments. Biologists may raise plants, animals, etc. in different conditions to see what happens, study the diseases they get and what pollution does to them.

Biology is divided into several areas in which people may specialize. They include *zoology*--the study of animals, *botany*--the study of plants, and *physiology*--the study of the body. *Geology* (the study of the earth), and *physics* (the study of matter and energy), and *chemistry* (the study of what things are made of and how they change from one substance to another) may also be involved in environmental research.

4. ENVIRONMENTAL CAREERS:

PEOPLE WHO USE THE NEW WAYS OF SAVING OUR ENVIRONMENT

It is important to have people who can find out new ways of using resources and preserving the environment, and people who can make sure that these ways are being used properly. But what about the people who really do the day-to-day work? Without them, no conservation would happen at all.

Waste Disposal. -- The dump and solid waste disposal worker runs the equipment that collects trash and destroys it or makes it into raw material that can be used again. He may be in charge of garbage and trash collecting, or he may run the actual machinery that re-cycles glass, aluminum, paper, or steel.

The *incinerator foreman* runs the furnace that burns trash. He must know how to use the furnace right, or the smoke will pollute the air. The *incinerator operator* helps him to direct the other workers in feeding materials into the incinerator. He must make sure it has the right temperature to burn everything completely. He may also repair equipment and dump or bury the ashes that are left.

The *power plant operator* runs the machines that produce electric power. He makes sure all the equipment is running at the right speed, is working properly, and is putting out the right amount of power, and calls for repairmen if he notices anything wrong. If his job is not done right, the machines could overload and blow up, or break down so that there is no electricity for the cities.

The *re-cycling operator* may decide what materials can be saved, and tell other workers how to sort, store, and send them where they can be re-used. If large objects have to be taken apart, he can check the parts for re-cycling or repair.

Water treatment plant operators take the water that comes from rivers and streams and make sure it is pure before letting it be used by people.

The *waste water treatment plant operator* takes care of the water that comes out of the sewers. He puts it through machines to make it pure again, and takes out any solid material that has gotten in. If water is purified and used again, we don't have to take more water from the mountains. People in this job use and take care of machinery and write down what happens.

If you want to know more, here are some places to write:

American Association of Community and Junior Colleges
Dupont Circle, NW
Washington, DC 20036

Ask for: *Environmental Education in the Community College*

American Fisheries Society
Fifteenth Street at New York Avenue, NW
Washington, DC 20005

Ask for: *Fisheries management information*

Department of Human Resources Development
Mail Control Unit
100 Capitol Mall
Sacramento, CA 95814

Ask for: *Fish and Wildlife Assistant, No. 447, Free*

Environmental Protection Agency
1626 K Street, NW
Washington, DC 20460

Ask for: *Working Towards a Better Environment--Some Career Choices and Information on Careers in Water Pollution Control*

National Sanitation Foundation
P.O. Box 1468
Ann Arbor, Michigan 48106

National Wildlife Federation
1412 16th Street, NW
Washington, DC 20006

Ask for: *Wildlife conservation and management information*

Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20006

Ask for: *Career Education in the Environment U.S. Office of Education, Division of Vocational and Technical Education, 1972. HE 5.6/2: EN 8/2 $3.00, paper*

Vocational Guidance Manuals
235 East 45th Street
New York, N.Y. 10017

Ask for: *Opportunities in Environmental Careers, $5.75*

The Wildlife Society
Suite 5-176
3900 Wisconsin Avenue, NW
Washington, DC 20016

Ask for: *Wildlife conservation and management information*

Exercise 2. Who Does What?

The purpose of this exercise is to give students a chance to check their understanding of the information about jobs given in the reading.

Reproduce and give students the questions on p. 119 . Sample answers are provided on p. 120 . These can also be given to students or read to them to allow them to check their work.

Additional Activities

Many fine films and other audio-visual materials are available on environmental careers. Check your school media catalogue, local media service, or the list on p. 143 for suggestions.

Further student involvement through use of some of these additional activities is highly recommended.

For instance, each student could be allowed to choose one environmental career to research and report on, or workgroups could be given careers or career areas to report on.

Another option would be to invite people with careers in this area to speak to the class. If several such people can be found, they could be invited to come on the same day and serve as a panel. Students should prepare for their visit by formulating questions to ask them. Such questions could include queries about the nature of the job, working conditions, background and training needed to enter, just how this job helps preserve the environment or make it safe for people, etc.

EXERCISE 2. WHO DOES WHAT?

As you have just learned, there are many possible careers in the area of environmental and resource management. Here are questions about some of them.

1. What are the four kinds of environmental careers?

   a.

   b.

   c.

   d.

2. Match the job titles with the statement that describes what they do:

a. forester .	. checks places that sell food to make sure they are clean and the food is healthy.
b. mechanical tester .	. tests water coming into a city and purifies it so it will be safe for people to drink.
c. health inspector .	. checks machines to make sure they are safe, don't cause pollution or make too much noise, etc.
d. wildlife manager .	. plants trees, decides which trees to cut, puts out fires, looks for new ways to use wood, etc.
e. soil scientist .	. decides which wild animals can be hunted, and how many can be killed, tries to make sure animals have enough food and water.
f. water treatment plant operator .	. studies a piece of ground and finds out if there is erosion, what kind of plants will grow there, whether it needs any minerals to grow better plants, etc.

SAMPLE ANSWERS

EXERCISE 2. WHO DOES WHAT?

As you have just learned, there are many possible careers in the area of environmental and resource management. Here are questions about some of them.

1. What are the four kinds of environmental careers?

   a. *taking care of the environment.*

   b. *making sure the environment are being used right.*

   c. *finding new ways to save the environment or resources.*

   d. *using ways of saving the environment.*

2. Match the job titles with the statement that describes what they do:

   a. forester

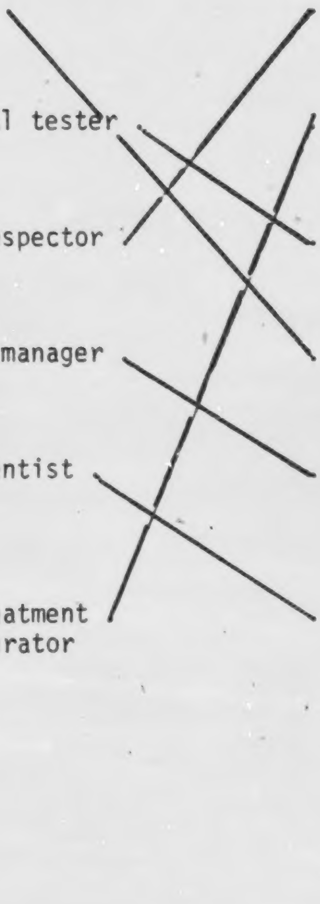
   b. mechanical tester

   c. health inspector

   d. wildlife manager

   e. soil scientist

   f. water treatment plant operator



checks places that sell food to make sure they are clean and the food is healthy.

tests water coming into a city and purifies it so it will be safe for people to drink.

checks machines to make sure they are safe, don't cause pollution or make too much noise, etc.

plants trees, decides which trees to cut, puts out fires, looks for new ways to use wood, etc.

decides which wild animals can be hunted, and how many can be killed, tries to make sure animals have enough food and water.

studies a piece of ground and finds out if there is erosion, what kind of plants will grow there, whether it needs any minerals to grow better plants, etc.

Activity 6.

Who Will Take Care Of The Land?

GOAL: To help students understand some of the environmental implications of a current land-use problem

OBJECTIVE: Given a land-use problem, students will identify job titles of people who would be useful in deciding how to solve it.

WHAT STUDENTS WILL BE ASKED TO DO

- Read or listen to a description of a problem involving resource use
- Answer questions relating the problem to careers

MATERIALS NEEDED

- pencils and paper
- reproduced pages from this Guide as indicated in exercise instructions

PROCEDURE

Knowledge is of little use unless it is applied. It is important that students realize that the environmental concepts they have been absorbing are relevant to their lives and futures, and that the jobs they have learned about play an important role in determining what that future will be like.

In this Activity, a case study approach is used. Students are asked to read a description of a controversy involving energy needs and environmental concerns. Review questions and an exercise are included. You may find that an article or other material on some local problem would be more relevant. If so, reproduce it for students or describe the problem, and ask students questions similar to those in Exercise 2.

Exercise 1. What's Happening To Our Land?

Ask students if they have been wondering why they need to know about the environment, and what use knowing about resource management careers can be to them? Tell them that after they have done this Activity, they may have some ideas about why.

In this exercise, they will be finding out about an environmental problem facing one Indian tribe. Unfortunately, almost any newspaper one could pick up would have at least one article about an environmental problem. The future will probably bring more of them, and as adults the students will be the ones who have to deal with them. Knowing about natural resource management may come in handy then.

On pp. 123-125 is a summary of an article which appeared in the Indian newspaper Akwesasne Notes*. It tells about the struggle of certain concerned members of the Cheyenne tribe to stop the big companies from strip-mining their reservation. This is a kind of problem which has faced many reservations, and will occur on more. Reading about it will introduce students to some of the common factors in these situations. The reading is followed by some review questions.

If, however, there is some ecological crisis going on in the students' home area at the moment, you might want to substitute an article about it or a description of it for the reading, or offer it as an additional activity. Similar review questions should be written for whatever material you choose.

Some of the more controversial films on the Resource List on p. 143 could also be shown and discussed for this exercise.

Reproduce and give students copies of the reading on pp.   or whatever material you substitute. Criculate among them as they read to make sure they are not having difficulties with the language, as newspaper articles may use some unfamiliar terms. When they finish, give them the review questions (p. 126).

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*A subscription to this newspaper could be a useful class resource. It runs accounts of ecological, social, and political problems faced by Indians, and other items of interest. Write Akwesasne Notes, Mohawk Nation, Rooseveltown, N. Y. 13683 for current subscription rate.

EXERCISE 1. WHAT IS HAPPENING TO THE LAND?

In summer of 1975, an Indian Newspaper called Akwesasne Notes carried an article called "The Northern Plains Are Being Carried Away And Burnt." Here are some of the things the articles said.

One hundred years ago, the Cheyenne tribe suffered to keep the land they lived on. Today, they are fighting to keep it worth living on. The power companies, the oil companies, bankers, and railroads, all want to strip-mine western coal. A lot of this coal is under Indian land. They say that western coal burns cleaner, and is easier for factories to use. The companies would also like to sell coal to other countries, like Japan.

City people might not think it matters if the northern plains are destroyed, but to those who live there, they are beautiful. There is lots of space, and the air is clean. Wild birds and animals live there too.

But underneath this land are one and a half trillion tons of coal--more than almost anywhere else in the U. S. The Cheyenne reservation is in the middle. The Bureau of Indian Affairs has already given some companies permission to look for coal. But no one seems to have thought about what digging up the coal will do to the land.

Strip mining is a total attack on the land. It uproots all the plants and drives all the animals away. Some may return, but none escape. Bulldozers may have to dig 25 feet to get at the coal. They push a long strip of it aside. The coal itself may go down another 80 to 150 feet. After they dig away the dirt, they use dynamite to blow up the coal. When they take the coal away, there is nothing left but a big hole and a pile of dirt. Strip mining also uses up a lot of water, which may be gone for good.

Some scientists say that once land has been strip-mined, it will never be the same again. Others say there are ways to make new soil and bring back the plants and animals. But even in places like Ohio, where there is lots of rain and it would be easy to get more soil, it costs a lot to do it. Mostly, the coal companies don't even bother to try.

People on other reservations where there has been strip-mining say it can ruin lives as well as land. Some of the things that can happen when the companies move in and start work are: not enough houses, people change jobs a lot, more people go on welfare, there is lots of drinking and fights, the hunting and fishing are ruined, people get unhappy and hurt buildings, cars, and each other, and many other problems.

Dave Robinson, who is a Northern Cheyenne, wanted to do something to stop the companies from strip-mining on Cheyenne land. He formed the Northern Cheyenne Landowners Association. They started a newspaper so they could tell people what was going on.

One problem is that the Bureau of Indian Affairs, which is supposed to take care of the reservation, is part of the U. S. Department of the Interior, which is supposed to find new energy resources for the country. They seem to feel it will be all right to strip mine Indian land if the Indians get some money for it. The Indians say they want to decide about that for themselves.

Tribal members don't all agree on what to do. Some leaders think there should only be a little mining. Some think the processing plants should be built somewhere else. Or they say that the mining towns should be off the reservation, or the companies should promise to hire Indians. Others say they should let the companies mine all they want, if they pay a lot.

The Cheyenne have people trying to find out exactly what strip mining will do, so they know what their choices are. There are also lawyers working to find out what rights the tribe has.

Strip mining will not solve the unemployment problem. What would happen to the jobs after the coal was all gone? There are some other things the tribe might do with its land. They are thinking of starting a cattle feedlot business, or a tribal wood products industry, with a forestry program and a fibre-board plant on the reservation.

The article ends by quoting Marie Sanchez, a Cheyenne Rancher. She says: "We need the land to exist as a people--everything else has been taken away. All that holds us together is this beautiful country that our ancestors fought for. Monetary gain is momentary--what will we say to our future children?"

REVIEW QUESTIONS

1. How does strip mining get the coal out of the land?

2. Two reasons the big companies want western coal are:
   a.
   b.

3. When the land is trip mined, what happens to:
   a. the plants?
   b. the animals?
   c. the water supply?
   d. the people?

SAMPLE ANSWERS

REVIEW QUESTIONS

1. How does strip mining get the coal out of the land?

   They dig down to the coal, push the earth to one side in a long strip, and blow up the coal so they can put it loose.

2. Two reasons the big companies want western coal are:

   a. *it burns cleaner*

   b. *they want to sell it to other countries*

3. When the land is trip mined, what happens to:

   a. the plants? *They are uprooted and destroyed*

   b. the animals? *They are killed or driven away*

   c. the water supply? *It is used up*

   d. the people? *There are not enough houses, people drink a lot, find it hard to keep jobs, go on welfare, fight a lot*

Exercise 2. Getting To Work Here

When students have finished reading, go over the content to be sure they have understood. When you have done, introduce this exercise by reminding students that they have just read about a problem in managing natural resources which is now facing Indian people. In order to make the best decisions, the tribes involved need advice from people who have been trained to work with the environment. But in order to preserve their land and develop businesses that will let them make money in the future, the tribes need trained environmental managers to work for them.

Make sure students have copies of the article, and the descriptions of environmental careers they read for Activity 5, and then give them the questions on p. 129.

These questions can be answered individually, but it would probably be better to pose them to each workgroup, so that students can discuss the answers.

As an elaboration of this exercise, you could assign each workgroup to prepare a report on what careers people in their own area could train for to help solve environmental problems and help the tribe develop economically. These reports could then be combined to produce a resource development plan. A member of the tribal council or other tribal employee concerned with resource development, could be asked to come to class and discuss the tribes plans in this area.

If the students are all from different areas, they might either study the area in which the school is located, or each student might prepare a report on his home area.

Additional Activities

Students could be encouraged to prepare a series of posters expressing the concepts that have been covered in this unit. The book Touch the Earth (see bibliography) has a number of quotations which express traditional Indian attitudes towards the land which would make good poster quotes.

Students could also write poetry on ecological themes. Some workgroups might be interested to putting together a play on the theme, "Who Will Take Care of the Land?"

If students are planning a field trip, this Activity should generate a number of additional things to look for and questions to ask.

EXERCISE 2. GETTING TO WORK HERE

Part I

You have just read about a tribe which has to decide how to use its natural resources. Suppose you were on the tribal council, which had decided it needed more information. What kinds of people would you want to talk to? You might want to ask questions like these:

1. If we let the company use or take away the resource, what will happen to the land, the plants, the animals, the water, etc.
2. What effect will it have on our people's lives?
3. Are there any other things we could do with our land that would not cause these problems?

What are the job titles of three people you might want to talk to?

What could each one tell you?

Part II

Suppose that the tribal council decided to give money to train young people in the tribe for careers in environment and resource management.

What are the three careers you think it would be most important for people in this tribe to train for?

How could each one help the tribe in the future?

Using The Test

The test questions on the next six pages are intended to check student mastery of the main points covered in this unit. If your presentation of this material has varied to any significant degree from what is in this book, you may want to add or replace questions on the test.

In addition to serving as a measure of student achievement, having students answer these questions can serve as a useful review activity.

Sample answers appear on pp. 137.

NAME ____________________________

DATE ____________________________

QUESTIONS FOR STUDENTS WHO HAVE FINISHED "LIVING WITH THE LAND"

1. Fill the blanks in these sentences with the right word.
   a. ____________________ is the study of how different parts of nature fit together.
   b. Plants take in ____________________ and produce oxygen.
   c. The organisms which break down the dead bodies of plants and animals and return them to the soil are called ______________
   d. _________________________ means keeping track of our resources and using them wisely.
   e. The air, water, soil, plants, and other things that affect us or that we use are all part of our ____________________

2. Describe or draw an example of a cycle in nature. Show as many of its stages or parts as you can.

3. Name four kinds of things that all people need no matter where they live.

   a.

   b.

   c.

   d.

4. Draw lines to connect things that traditional and modern people use to meet the same needs.

a. travois .	. refrigerator
b. fireplace .	. burglar alarm
c. storage pit for corn .	. bottle of pills
d. buffalo robe .	. electric stove
e. dog .	. truck
f. pouch of herbs .	. living room rug

5. How are modern city homes different from traditional ones in the:

   a. kinds of resources they use?

   b. kinds of energy they use?

c. way they get rid of waste?

6. What are two sources of power that can not be replaced?

a.

b.

What are two sources of power that can be replaced?

c.

d.

7. Check each of the following which is an example of re-cycling:

___ a. burying garbage

___ b. burning newspapers

___ c. burying old bottles

___ d. taking your old car to a junk dealer

___ e. driving to an ecology action meeting

___ f. selling empty aluminum cans back to the company.

8. What are the three kinds of waste?

a.

b.

c.

9. Describe or draw pictures of three things than can cause pollution and show what they do.

a.

b.

c.

10. Briefly say what each of the following people does:

a. game warden

b. watershed manager

c. food and drug inspector

d. waste disposal worker

11. Think of one thing you know about that people want to do to the environment that might cause problems (this could be taking something out of the land, adding something to it, building something, etc.)

a. what is it?

b. why might it be a problem?

12. Who (what job title) would you ask to help you solve these problems?

Problem	Job
a. Nothing will grow on your farm:	
b. You want to re-cycle the water your town uses:	
c. You need to know how many deer you should allow hunters to kill on your land this year:	

Sample Answers

50 possible points

NAME ______________________________

DATE ______________________________

QUESTIONS FOR STUDENTS WHO HAVE FINISHED "LIVING WITH THE LAND"

5 pts. 1. Fill the blanks in these sentences with the right word.

a. *Ecology* is the study of how different parts of nature fit together.

b. Plants take in *carbon dioxide* and produce oxygen.

c. The organisms which break down the dead bodies of plants and animals and return them to the soil are called *bacteria*.

d. *Conservation* means keeping track of our resources and using them wisely.

e. The air, water, soil, plants, and other things that affect us or that we use are all part of our *environment*.

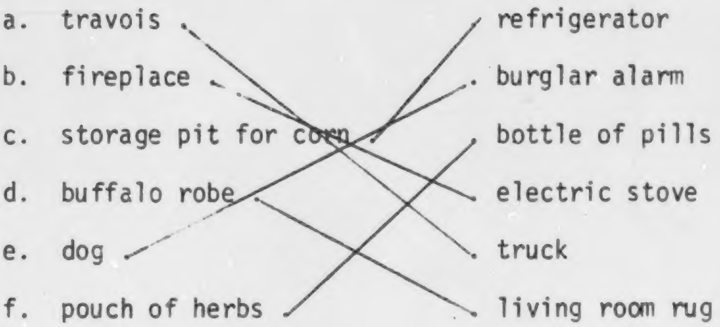
5 pts. 2. Describe or draw an example of a cycle in nature. Show as many of its stages or parts as you can.

The description or drawing should indicate that each part or stage in the cycle depends on the one before it, and that the cycle repeats itself.

4 pts. 3. Name four kinds of things that all people need no matter where they live.

a. *food*
b. *shelter* *or phrases that imply these four*
c. *security* *need areas*
d. *aids*

3 pts. 4. Draw lines to connect things that the traditional and modern people use to meet the same needs.



a. travois	refrigerator
b. fireplace	burglar alarm
c. storage pit for corn	bottle of pills
d. buffalo robe	electric stove
e. dog	truck
f. pouch of herbs	living room rug

6 pts. 5. How are modern city homes different from traditional ones in the:

a. kinds of resources they use?

modern homes use many man-made materials--traditional ones use all natural materials. Modern homes also contain things made from many more kinds of materials.

b. kinds of energy they use?

modern homes use fossil fuels and electricity, whereas traditional homes use fire and muscle power.

c. way they get rid of waste?

modern homes destroy or dumps most of their waste--traditional homes re-use things when possible or let them return to the soil.

4 pts. 6. What are two sources of power that can not be replaced?

a. } *oil, gasoline, gas, coal*
b. }

What are two sources of power that can be replaced?

c. *solar energy, wood*

d. *water power, wind power*

3 pts. 7. Check each of the following which is an example of re-cycling:

___ a. burying garbage
___ b. burning newspapers
___ c. burying old bottles
✓ d. taking your old car to a junk dealer
___ e. driving to an ecology action meeting
✓ f. selling empty aluminum cans back to the company.

3 pts. 8. What are the three kinds of waste?

a. *trash*

b. *garbage*

c. *sewage*

6 pts. 9. Describe or draw pictures of three things than can cause pollution and show what they do.

a. *The pictures or descriptions should show causes of air, water or land pollution such as smoke and fumes, pesticides, fertilizer and sewage, building, mining, littering, pesticides, erosion, etc.*

Results shown could include people caughing, smog, smoke in the air, dust storms, fish dying, rivers full of trask, muddy rivers, land with dying plants or animals, heaped dirt and gashes, miles of tract houses, litter in ground, burnt forests, eroded land, etc.

b.

c.

4 pts. 10. Briefly say what each of the following people does:

a. game warden--*makes sure people obey laws that protect animals and fish, teaching and enforcing conservation and safety rules, collecting information about animals in his area.*

b. watershed manager--*take care of an area which produces water, make sure people use their share, advise on building dams, prevent pollution and erosion, etc.*

c. food and drug inspector--*check businesses that make, handle, store, and sell food and drugs to make sure they meet legal standards.*

d. waste disposal worker--*collect or run equipment that destroys or re-cycles trash, garbage, etc.*

4 pts. 11. Think of one thing you know about that people want to do to the environment that might cause problems (this could be taking something out of the land, adding something to it, building something, etc.)

a. what is it? *If students have read about strip-mining on the Cheyenne reservation, they will probably describe it. Other causes of problems might be building a dam, cutting down forests, building factories, using pesticides.*

b. why might it be a problem? *Problems described might include destructing the soil, social problems, flooding good land, erosion, poisoning of land, effects on plants and animals nearby, various kinds of pollution.*

3 pts. 12. Who (what job title) would you ask to help you solve these problems?

Problem	*Any of these:* Job
a. Nothing will grow on your farm:	*agronomist, soil scientist, biologist, range manager etc.*
b. You want to re-cycle the water your town uses:	*waste water treatment plant operator*
c. You need to know how many deer you should allow hunters to kill on your land this year:	*game or wild life manager, game biologist, fish and game warden*

Additional Resources

Starting on the next page, you will find a list of audio-visual materials which you can use to supplement and enrich the material presented in this unit. For your convenience, the list has been divided so that you can find a separate set of audio-visual materials for each Activity in the unit. Also, each audio-visual aid has been described.

The list of resources was compiled by the Native American Career Education Staff, but no endorsement of the materials and programs included is intended. It is recommended that any item on the list be previewed before it is considered for adoption.

r = rental fee
col. = color

m = minutes
b & w = black and white

ACTIVITY 1: WHAT IS ECOLOGY ALL ABOUT?

FILMS:

Life in the Woodlot

McG-H 16 minutes 30 seconds color r $15

A surprising peek into the hidden world of the underbrush where silent, relentless rivalry is concealed by overhanging foliage or carpets of woodland flowers. What the film brings into focus is a pryamid of life in which lower orders of fauna sustain and support the higher orders. In the plant world the film witnesses a similar struggle for supremacy. (Awards: Italy; Canada.)

Beaver Valley

EMC #3212 Col. 32 minutes r $22

Fascinating medley of animal life representing years of patient recording. The beaver, otter, coyote, and other inhabitants of the woodlands are faithfully presented with an appropriate musical scone.

Chain of Life

EMC #7865 col 30 minutes r $23

Shows that man limits his own survival when he disrupts other links in nature's chain. Gives examples of man's tampering with and destruction of various parts of the natural environment. Relates profit motive and concern for product appearance to destruction of major sources of food and natural resources.

Conservation and Balance in Nature

EMC #6233 col 18 minutes r $18

Relates the balance in natural ecological systems to one of the most critical questions of our time: What is man doing to his environment? Interrelation of organisms in food webs is seen to involve delicate balance.

ACTIVITY 1: WHAT IS ECOLOGY ALL ABOUT?

Home

EMC # 8524 col 29 minutes r $22

As a speech addressed to the U.S. government by Chief Seattle of the Duwamish tribe, circa 1959, is read in translation, scenes depict the present day pollution and despoliation of America's heritage of natural beauty. Chief Seattle's words are heartbreakingly poignant and prophetic as he says, "If we sell you our land, you must remember it is sacred and you must teach your children it is sacred." When he states repeatedly, "I am a savage and do not understand," the irony is overwhelming, for on the screen is conclusive evidence of the destructive attitudes and way of life of those to whom he is speaking--which raises the crucial question of who is "civilized" and who is "barbaric".

Also suitable for use after Activity #6.

Survival of the Prairie

EMC #7753 col 53 minutes r $32

Shows how ecological balance of the plains was destroyed by the plough. Describes reconstruction efforts and examines ways to use land productively while maintaining balance of nature.

ACTIVITY 2: WHAT DO WE NEED?

Sodbusters

EMC # 8896 col 29 minutes r $23

Argues that Americans must renounce values formed during their frontier experience, when there were few people and abundant resources, and adapt new values reflecting current realities such as dwindling resources, overpopulation, and a polluted environment.

Little Big Land

EMC # 8897 col 29 minutes r $23

Shows how the tremendous growth of our cities and highways has obliterated many of the earth's natural systems. Suggests some principles of land use planning and population control that will accommodate human needs without destroying the land.

ACTIVITY 2. WHAT DO WE NEED? (continued)

Island of the Blue Dolphins

EMC #7087 col 20 minutes r $16

Story of a Chumas Indian girl who was left behind with her little brother when her people left their island. Good opportunity to consider what people need to survive.

ACTIVITY 3. GETTING WHAT WE NEED

Riches of the Earth

1974-75 Rental per day $15 16 minutes 18 seconds color
Stirling Educational Films

Colorful animation depicts the formation, through geological ages, by fire and water, wind and ice, of the earth's crust which holds our wealth of minerals, oil, coal, arable land, and even our water power. (Awards: Venice; Padua, Italy.)

What in the World is Water?

McG-H, 11 minutes 38 seconds color r $12.50

Water in function serves as willing worker, shaping the land, shifting earth or rock, carrying the food by which plants survive and so supporting other forms of life. This film is designed primarily to show to students the astonishing utility of this common substance, but it shows, too, the beauty of water in movement, from raindrops pelting the earth to the mighty cataract of Niagara.

Clean Waters

EMC #3972 color 20 minutes r $17

Illustrates the danger of pollution to fish and wildlife, city water supply systems, recreational facilities, and public health. Proper sewage treatment is explained.

Ecology, The Silent Bomb

EMC #8395 color 23 minutes r $28

Explores environmental problems and their relation to future population growth. Discusses pollution, population control, energy, and nuclear power.

ACTIVITY 3: GETTING WHAT WE NEED (continued)

Energy

EMC #7905 color 12 minutes r $14

Demonstrates power systems and the transformation of energy. Shows gases forming in the sun and solar energy transformed in lightening, rain, clouds, and the water wheel. Divides power systems into 3 components--fuel, conversion, and transmission--and illustrates discoveries of each type, such as the steam engine, electricity and wire transmission, rockets, the atom as fuel, the laser as transmitter, and modern utilization of solar energy. Imaginative visual treatment.

House of Man, Part I--Our Changing Environment

EMC # 7225 color 17 minutes r $17

Examines problems of the modern city and traces man's development from prehistoric to modern times, pointing out that his increasing power to control his environment has created new pressures and problems. Viewers are challenged to take an active part in the conservation of human as well as natural resources.

Problems of Conservation Series

Air: EMC #7602 color 15 minutes r $15
Cause and control of air pollution

Forest and Range: EMC #7821 color 14 minutes r $15
Describes land, multiple use concept, conservation methods.

Minerals: EMC #7822 color 16 minutes r $17
Points out that new deposits or substitutes must be found.

Soil: EMC # 7823 color 14 minutes r $15
Explains importance of soil resources and shows abuse, reclamation, and maintenance.

Water: EMC #7824 color 16 minutes r $17
Focuses on region around Colorado river. Cloud seeding, desalinization, retrieval of runoff. Pollutants and their elimination.

ACTIVITY 4: WHERE DOES IT ALL GO

Man: The Polluter

McG-H 53 minutes 20 seconds color r $30

A richly illustrated cartoon film that enlarges on man's capacity to foul his own nest, and to ignore it. Made by a joint team of Canadian and Yugoslav animation artists, the film transmits its warning with unflagging humor, imagination, movement and design. In between animated sequences Dr. Fred H. Knelman, Professor of Science and Human Affairs, Sir George Williams University, Montreal, comments on the import of what is shown and on what lies in store if more responsibility is not taken on a global scale to conserve what is left of vital resources and livable environment. A co-production of Zagreb Film (Yugoslavia) and NFB.

Air Pollution

EMC #8389 color 22 minutes r $28

Examines extent of air pollution in North America and surveys some recent research into air pollution control. Efforts to recycle pollutants and waste are shown.

DDT--Knowing it Survives Us

EMC #8092 color 30 minutes r $24

Examines the environmental effects of DDT. Focuses on the California Brown Pelican, an "endangered species" that suffered a total reproductive failure in 1969 largely due to DDT. Scientists describe its effects on wildlife, the environment in general, and man.

Waterfowl--A Resource in Danger

EBEC 16 minutes 27 seconds color or b&w r $8.00, $5.50

The prairies are the incubators of vast numbers of waterfowl, principally ducks, but as more land is drained and cultivated there are fewer breeding grounds. This film shows the immense flocks of birds, their habits, and their dependence on the wetlands of the prairies. How to maintain living space for the ducks without having them pose a threat to farmers' grainfields is a problem being studied by wildlife conservationists. Produced for Department of Northern Affairs and National Resources.

ACTIVITY 4: WHERE DOES IT ALL GO (continued)

"Water, water, everywhere..."

SFD 4 minutes 45 seconds color r $15

An underwater close-up of the death of a trout in polluted water. A film for conservationists and for all audiences concerned about preserving the natural world and the creatures that inhabit it. (Award: Chicago.)

Paradise Lost

Bench 3 minutes 48 seconds color r $15

A plea without words, made by artist and animator Evelyn Lambart, for the right of all wild creatures to a clean, unpolluted environment. With style, color and movement sensitive to the subject, the film shows how birds, butterflies and other woodland creatures succumb to air pollution spread by the inventions of man. (Award: Oakland, California.)

Recycling in Action

EMC #8771 color 14 minutes r $16

Demonstrates how a community solid-waste reclamation profit can work, and how paper, metal, glass, and plastic waste is transformed into new products. Shows that recycling is necessary, possible, and profitable.

The Economics of Pollution

ANCER: H. 1-55 filmstrip.

This filmstrip emphasizes the concept of the cost factor involved in pollution. It is pointed out that the cost of pollution ultimately is borne by the victim. An analysis is made as to whether this cost is larger than the cost of solving the problem.

ACTIVITY 5: DOING SOMETHING ABOUT IT

When You Grow Up

Mini Products #101 filmstrip Natural Resources.

ACTIVITY 5: DOING SOMETHING ABOUT IT (continued)

Occupations in Ecology

Career Discoveries Series #142 -- 3 cassettes, 6 films

Films: Overview
Food Processing Laboratory Technician
Soil Conservation Technician
Water Plant Operator
Forestry Technician
Sanitation Technician

What is Ecology?

EMC #6024 11 minutes r $10

Shows how biologists study the interrelationships among plants, animals, and their environment, and explains the importance of such studies to mankind. Major biomes of the world are introduced.

Materials from the Apache-Navajo Career Education Media Center:

Marine Science

E-5-114, 16 mm. film, 6 minutes

In this film, children will discover that the oceans and seas provide us with many things and that lots of interesting animals live in the sea.

Environment

E-5-120, 16 mm. film, 5 minutes

In this film, children will discover that the environment involves people, animals, and plant life--all living things.

Forest Service

CE-18, Information sheets and briefs

Information for employment in the forest service.

Career Information: Forester

CE-27#1, pamphlet

ACTIVITY 5: DOING SOMETHING ABOUT IT (continued)

University Career Opportunities: Mines & Minerals

CE-40, Narrative 8 filmstrips, cassettes

Jobs in Outdoor Work

JH-11, 2 booklets

Exploring Occupations in the Natural Resources

JH-74, A resource guide for grades 7, 8, and 9.

Vocational Biographies:

JH-76, book

Includes sections on Nurseryman, Soil-Conservation Technician

JH-78, book

Includes sections on City Planning Technician, Agriculture Journalist, Rancher, Meteorologist

JH-79, book
Includes sections on Environmental Education Specialist, Outdoor Film Reporter, Radiation Safety Officer

JH-80, book
Includes sections on Fishery Biologist, Pest Control Operator, Assistant State Conservationist

JH-82, book
Includes section on Soil Biochemist

JH-83, book
Includes sections on Agricultural Research Scientist, Forester

JH-87, book
Includes sections on Refuse Hauling Manager, Seed Analyst, Farm Manager

JH-88, book
Includes sections on Historic Site Supervisor, City Planner, Mosquito Control Manager, Professor of Animal Science, Biological Technician

ACTIVITY 5: DOING SOMETHING ABOUT IT (continued)

JH-89, book
Includes sections on Assistant Wildlife Manager, Forest Manager, Research Food Scientist

JH-92, book
Includes sections on Fish Culturist, Physical Science Technician, State Park Superintendent, International Agricultural Economist, Assistant State Geologist

JH-93, book
Includes sections on Consulting Geologist, Environmental Planner, Research Geologist

JH-94, book
Includes sections on County Naturalist, Engineering Geologist, Mountain Climbing Guide, Applied Oceanographer, Petroleum Geologist

JH-95, book
Includes sections on female Animal Warden, Consumer Safety Officer, Geologist

Making a Living in Conservation

H.1-38, book
Covers a variety of conservation occupations and information about where to find out more.

Careers in Forestry

H.1-52, 10 pamphlets
Covering work, training, etc.

Careers in Conservation

H.1-53, 2 filmstrips, 2 cassettes,
Helps students become aware of the great variety of careers available.

ACTIVITY 5: DOING SOMETHING ABOUT IT (continued)

Phoenix Indian School Filmstrips:

Careers

1064 FS No.	A Future in Agriculture
875	Chemical Changes

Energy

946	Energy Today and Tomorrow

Conservation

Conservation is Everybody's Business Series

639	Saving the Soil
640	Using the Forests Wisely
610	People, Our Most Valuable Resource
641	Nothing Can Live Without Water

ACTIVITY 6: WHO WILL TAKE CARE OF THE LAND

A Crowded Wilderness

McG-H 8 minutes 59 seconds color r $12.50

Spacious, limitless as they may seem, Canada's national parks may not be able to keep up with the demands made on their resources without a continuing program of extending the parks system. Empty wilderness may, in fact, be the greatest heritage this generation of Canadians can leave to future generations. The problems, and the need to act now, are well defined in this film by concerned conservationists

American Wilderness

EMC #7854 color 53 minutes r $32

Survey of problems involved in securing and protecting different kinds of wilderness area--swamp, desert, forest--and conflicts between consumer demand and user, commercial management, and federal recreational and wilderness policies. Concludes that wilderness areas must be preserved regardless of pressures.

Black Coal, Red Power

EMC #9104 color 41 minutes r $27

Revealing study of the way strip-mining for coal on Navajo and Hopi reservations in Arizona is destroying the ecological balance of the land and the traditional economy of the Indians. Shows that the Indians permitted the strip-mining in exchange for a loosely worded promise of jobs and royalties as well as a pledge, which may be impossible to keep, to return the land to its original state. Particularly critical of government and industry policies which, it is argued, deliberately fail to tap alternative energy sources.

Bulldozed America

EMC #6665 25 minutes r $14

Shows the triumph of the bulldozer and commercial interests as they tear the countryside apart and turn it into supermarkets, highways and automobile dumps. Looks at the problem in terms of the entire nation. Included are scenes of the destruction of California's giant redwood forests, with the floods that follow, and the damming of the river that will back water into the Grand Canyon National Park.

ACTIVITY 6: WHO WILL TAKE CARE OF THE LAND (continued)

Coal

EMC #8826 color 26 minutes r $24

Explores the possibilities of turning coal into oil and natural gas, then focuses on the controversy surrounding the strip-mining of coal in Montana. Notes that coal is the most plentiful fossil fuel in the U.S., but that it is also the most damaging to the environment both when mined and when used.

Hopis: Guardians of the Land

EMC #8537 color 10 minutes r $14

Sensitively documents the life and philosophy of the Hopi Indians of the southwest U.S., showing their respect and love for the sanctity of the land and a fundamental belief in the unity of nature. Reveals that the Hopi's land as well as their way of life is now threatened by strip-mining and oil refineries, eloquent scenes of ravaged landscapes and spectacular desert sunsets obscured by billowing smoke make a powerful plea for help in the Hopi's struggle to protect their land.

Multiply and Subdue the Earth

EMC #7748 color 67 minutes r $31

Traces the origins of European man's attitudes towards the earth and its resources, and explores the religious, psychological, and economic roots of his fear of nature and drive to control, exploit, and destroy it. Attacks the political core of the problem. Proposes provocative and controversial solutions. Central message is that people must use ecological planning and seek not conquest, but unity with nature.

Slow Death of Desert Water

EMC #7861 color 30 minutes r $23

Shows how Pyramid Lake, in Nevada, is drying up because dams divert most of its source, a river from lake Tahoe, which is itself becoming polluted. Examines problem of maintaining a minimum water flow into Pyramid Lake while wildlife, irrigation districts, Indians, and cities all want the water. Forcefully shows damaging effects of civilization, especially airplanes and motor boats, on bird nesting grounds and rare desert fish.

RENTAL SOURCES:

ANCER (Apache-Navajo Career Education Media Center) P.O. Box 749,
St. Johns, Arizona 85936
Available to schools in Navajo and Apache Counties in Arizona

Bench (Benchmark Films Inc.) 145 Scarborough Road, Briarcliff Manor,
New York 10510

Career Discoveries Series, Guidance Associates, Pleasantville, New York 10570

EBEC (Encyclopedia Brittanica Corp.) 425 No. Michigan Avenue, Chicago,
Illinois 60611

EMC University of California Extension Media Center, Berkeley, CA 94720

McG-H (McGraw-Hill Films) 1221 Avenue of the Americas, New York, New York
10020

Mini Productions, Inc., 192 Hyeholde Drive, Corapolis, Pennsylvania 15108

NFBC (National Film Board of Canada) 16th Floor, 1251 Avenue of the Americas,
New York, New York 10020

Phoenix Indian School, Box 7188, Phoenix, Arizona 85011

SFD Schoenfeld Film Distributing Corp., Suite 905, 165 W. 46th Street,
New York, New York 10036

Sterling Educational Films Inc., 241 East 34th Street, New York, New York
10016

Bibliography

These books are recommended for use in conjunction with the unit as a whole:

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National Wildlife Federation. Endangered Species. Educational Servicing Station, 1412 16th Street, NW, Washington, D.C. 20036

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Sauer, Carl. Man in Nature: America Before the Age of the White Man. Berkeley: Turtle Island Foundation (2845 Buena Vista Way), 1975.

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Waters, Frank. The Book of the Hopi. New York: Ballantine Books, 1963.

Weltfish, Gene. The Lost Universe. New York: Ballantine Books, 1965.